SOIL SURVEY

Waldo County Maine

Series 1940, No. 16

Issued June 1955

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
In cooperation with the
UNIVERSITY OF MAINE AGRICULTURAL EXPERIMENT STATION

How to Use THE SOIL SURVEY REPORT

FARMERS who have worked with their soils for a long time know about the soil differences on their farms, perhaps also on the farms of their immediate neighbors. What they do not know, unless soil surveys have been made, is how nearly their soils are like those on experiment stations or on other farms, either in their State or other States, where farmers have gained experience with new or different farming practices or farm enterprises. They do not know whether these yields obtained by farmers in other parts of their county and State are from soils like theirs or from soils so different that they could not hope to get yields as high, even if they followed the same practices. One way for farmers to avoid some of the risk and uncertainty involved in trying new production methods and new varieties of plants is to learn what kinds of soils they have so that they can compare them with the soils on which new developments have proved successful.

SOILS OF A PARTICULAR FARM

To find what soils are on any farm or other land, it is necessary first to locate this land on the large colored map that accompanies this report. This is easily done by using landmarks such as roads, streams, villages, dwellings, and other features to locate the boundaries.

Each kind of soil mapped within the farm or tract is marked on the map with a symbol. For example, all the areas marked Bo are Bangor silt loam. The color in which the soil area is shown on the map will be the same as the color indicated in the legend for the particular type of soil. If you want information on the Bangor soil, turn to the section in this publication on Soil Series, Types, and Phases and find Bangor silt loam. Under this heading you will find a statement of what the characteristics of this soil are, what the soil is mainly used for, and some of the uses to which it is suited.

Suppose, for instance, you wish to know how productive Bangor silt loam is. You will find the soil listed in the left-hand column of table 6. Opposite the name you can read the yields for the different crops grown on it. This table also gives estimated yields for all the other soils mapped in the county.

If, in addition, you wish to know what uses and management practices are recommended for Bangor silt loam, read what is said about this soil in the section on Soil Series, Types, and Phases. Refer also to table 5 in the section Use and Management, where the soils are grouped according to similarity in management requirements and suitable crops, rotations, and supplemental practices are given for each group.

SOILS OF THE COUNTY AS A WHOLE

A newcomer to the county, especially if he considers purchasing a farm, will want to know about the climate; the types and sizes of farms; the principal farm products and how they are marketed; the kind of conditions of farm tenure, equipment, and machinery; availability of roads, railroads, electric services, and water supplies; the industries of the county; and cities, villages, and population characteristics. Information about all these will be found in the section on General Nature of the Area.

Those interested in how the soils of the county were formed and how they are related to the great soil groups of the world should read the section on Morphology and Genesis of Soils.

This publication on the soil survey of Waldo County, Maine, is a cooperative contribution from the—

SOIL CONSERVATION SERVICE
and the
UNIVERSITY OF MAINE AGRICULTURAL EXPERIMENT STATION

Series 1940, No. 16 Issued June, 1955

SOIL SURVEY OF WALDO COUNTY, MAINE

By K. V. GOODMAN, Division of Soil Survey,[1] in Charge, and SNYDER VON DAY, Soil Conversation Service, United States Department of Agriculture, and D. B. LOVEJOY and J. R. ARNO, University of Maine Agricultural Experiment Station

Area inspected by W. J. LATIMER, Soil Scientist, United States Department of Agriculture

United States Department of Agriculture in cooperation with the University of Maine Agricultural Experiment Station

CONTENTS

[1] Field work for this survey was done and the manuscript prepared while the Division of Soil Survey was part of the Bureau of Plant Industry, Soils, and Agricultural Engineering, Agricultural Research Administration. It was transferred to the Soil Conservation Service on November 15, 1952.

COLONISTS began carving farms from the almost unbroken forests in Waldo County about 1731. As population increased, shipbuilding and woodworking became important because of the abundance of good timber, and fishing and other industries that provided good markets for farm products were developed. Agriculture reached its peak about 1880 and began to decline as the West was opened to homesteaders and the poorer New England soils failed to maintain crop yields. Adjustments to changing conditions were made gradually. Diversified farming is now generally practiced. Dairying, poultry raising, and the growing of forage for livestock are important. Potatoes, apples, and vegetables and small fruits for commercial canning are widely grown. Manufacturing, principally in the city of Belfast, processing of farm products at Liberty, Brooks, Freedom, Unity, and other villages, quarrying, fishing, and some cutting of cordwood and lumber are the main nonagricultural enterprises. The processing plants provide a market for much of the farm produce, and summer vacation trade has improved markets for farm products. To provide a basis for the best uses of the land this cooperative soil survey was made by the United States Department of Agriculture and the University of Maine Agricultural Experiment Station. Field work was completed in 1940, and, unless otherwise specifically mentioned, statements in this report refer to conditions in the county at the time of survey.

GENERAL NATURE OF THE AREA

LOCATION AND EXTENT

Waldo County, located at the approximate center of the Maine coast, is bounded on the east by the Penobscot River and includes several islands in Penobscot Bay (fig. 1). On the south are Knox and Lincoln Counties; on the north, Somerset and Penobscot Counties; and on the west, Kennebec County. The Sebasticook River flows along the northwestern corner. Belfast, the shiretown, or county seat, is 30 miles south of Bangor, 40 miles east of Augusta, the State capital, and 85 miles northeast of Portland. The county covers an area of approximately 734 square miles, or 469,760 acres.

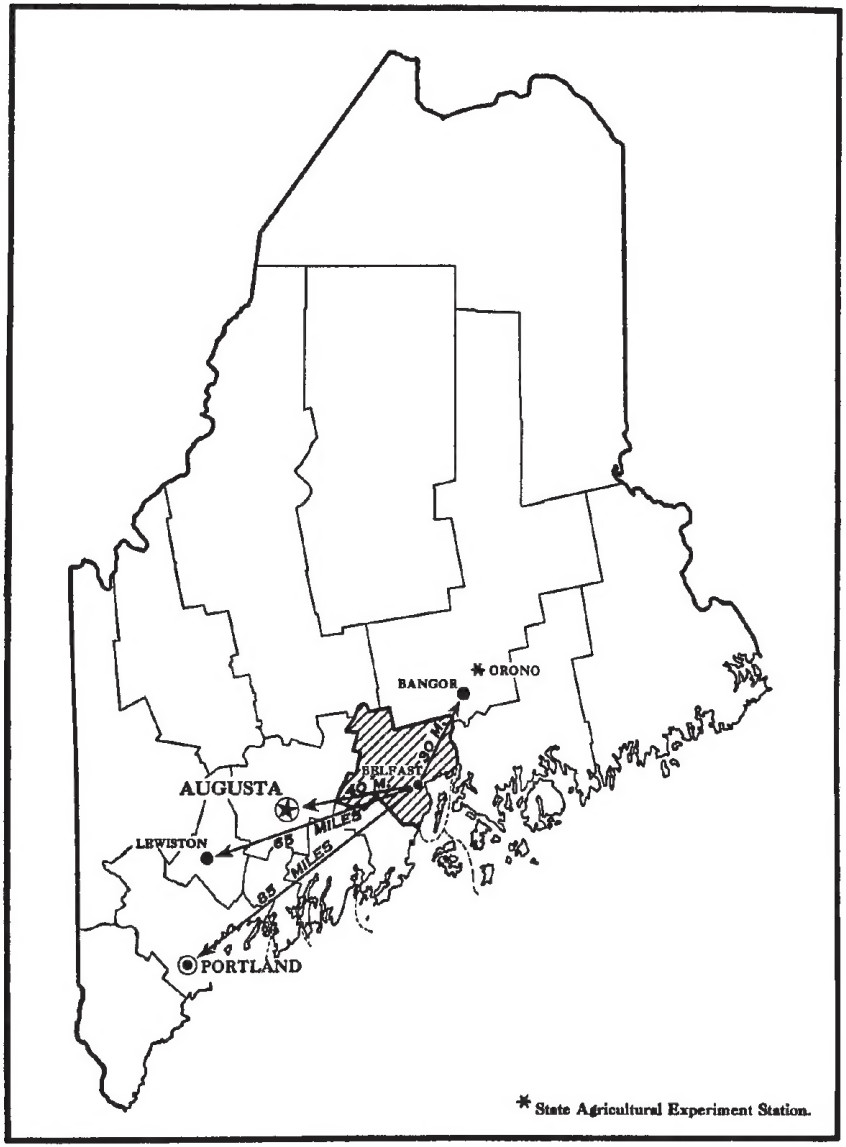

FIGURE 1.—Location of Waldo County in Maine.

PHYSIOGRAPHY AND RELIEF

The county is in the glaciated section of New England, and relief is somewhat rugged. A glacier some thousands of feet thick passed over the area in a general north-south direction and, on receding, left remnants of an old mountain range in the form of rounded peaks in the northeastern and southeastern parts of the county. Lesser hills are in the central part, and rolling hills of glacial till separated by swamps of peat and muck are in the western.

The mountain area in the southeastern part is most prominent near Megunticook Mountain in Knox County. In this area are Bald Rock Mountain, altitude 1,100 feet; Levenseller, 1,020 feet; Moody, 860 feet, and Ducktrap, 740 feet. A series of such hills, and swamps and lakes, extends into Knox and Lincoln Counties on the south. The other principal mountainous area is in the extreme northeastern part of the county, and in that area the highest elevation is Mount Waldo, altitude 1,062 feet. Near the village of Center Montville is Frye Mountain, altitude 1,140 feet; and scattered in the county are high hills and ridges, as Hogback Mountain in Montville town (township), and Oak Hill near the village of Waldo. The northern part of the county, like the southern, is somewhat hilly, as it includes part of the Dixmont Hills and part of Mount Harris, most of which are in Penobscot County.

The north-central part of the county is mostly a continuous area of higher ridges and knolls of shallow glaciation interspersed with some lower ridges of glacial till and outwash. The general elevation of the higher ridges and knolls is 600 to 900 feet, and the glacial till is at about 400 to 500 feet. More prominent elevations in this area are Common, Goodwin, and Chicks Hills, and Snow and Robertson Mountains.

The best farm land is on the many long broad-topped moderately steep-sided ridges of glacial till. These ridges have a general north-south trend; a good example is Knox Ridge near Thorndike (see pl. 3, *A*). This ridge is in the north-central part of the county, but similar ridges occur frequently in the western and northwestern parts. The entire northwestern corner of the county near Unity Pond consists of glacial till ridges and intervening swamps. Irregular bands of sandy and gravelly outwash in the form of eskers, kames, and small delta plains—good examples of which are near the villages of Unity and Monroe and north of Winterport—usually border the ridges of glacial till.

Swampy lowlands of nearly level relief almost invariably surround the lakes and rivers. Some of the swamps contain peat or muck, and others are of silt or clay, or of gravelly bottom land or terrace material. In some swamps silt or clay is covered by about 10 inches of muck. Low-lying areas of lacustrine (lake-deposited) silts and clays are prominent from just west of Unity Pond (see pl. 3, *B*) northward, and near Megunticook Lake south of Lincolnville Center. The lowlands, or swamps, are about 200 feet above sea level, but occasional bogs in interstream areas between ridges may be higher. Except for a few mucky areas in the mountains, however, few swamps occur at an altitude greater than 400 feet. In places, as along the Penobscot Valley, there are lowland areas where some marine (ocean-laid) silt and clay deposits have been raised in recent geologic time. These areas have an elevation of 200 feet or less and, though level in general aspect, have been somewhat dissected. Along water channels their relief is characterized by many short steep-sided slopes.

Offshore islands, particularly Islesboro, have the same general physiography as the rest of the county. Ridges of shallow glaciation (ledge land) are interspersed with areas of deeper glacial drift.

Elevations are markedly lower than in corresponding mainland areas; the highest point on Islesboro, just north of Dark Harbor, is about 150 feet.

DRAINAGE

The county is generally a height of land, and drainage is through short streams and rivers flowing into the Sebasticook River on the northwest, the Penobscot on the east, or directly into Penobscot Bay and the Atlantic Ocean. The Penobscot River is the only navigable waterway, but some of the more prominent streams are the Medomak River near South Liberty, the Sheepscot River flowing through Sheepscot Pond in the southwestern corner of the county, the Passagassawaukeag near Belfast, and the Goose River flowing from Swan Lake into Belfast Bay. Many other sizeable brooks and permanent streams occur throughout the county.

The streams and rivers are more or less postglacial, and somewhere along their courses almost all of them flow into or out of glacial lakes. These watercourses and lakes, along with connecting bogs and swamps, formed the general pattern of glacial drainage during the recession of the last ice sheet. The general direction of the lakes and swamps is northeast-southwest. The lakes are variable in size and generally long and irregular in outline. The largest bodies of water—Unity, Pitcher, Sheepscot, and Quantabacook Ponds, and Swan, Megunticook, and St. George Lakes range in size from 1 to 5 square miles. Swan, St. George, and Megunticook Lakes and Unity and Pitcher Ponds have deep water on one side, but most of the lakes have shallow margins. Smaller ponds and lakes with shallow margins may be somewhat deep at the center.

The rivers and streams provide adequate drainage for all except the large flats or swamps occurring west and north of Unity and extending in a northeast-southwest direction through the towns of Searsmont, Morrill, and Waldo. These swamps and others in isolated places, as Herricks bog south of Belfast and Jones bog near Monroe Center, have no pronounced drainage, but streams passing through them, or nearby, afford outlets for artificial drainage if it is desired.

The postglacial streams have started the process of geologic dissection, and natural drainage of many lakes and marshes eventually will be completed. The Sebasticook River, bordering the northwestern corner of the county, is an example of such dissection; the Penobscot River, on the northeastern border, and the St. George River have cut deep channels through the glacial deposits and, in many places, into the underlying ledges. One example of such stream action is the small gorge cut by the Penobscot River at Fort Knox.

CLIMATE

The climate of the county is continental temperate over all parts except a narrow band along Penobscot Bay, where oceanic influences cause chiefly a reduction in the severity of early winter and late spring and a moderation of midsummer heat. Winters are fairly long. As in most of New England, short hot spells of 2 or 3 days duration occur frequently during July and August, and infrequently in September.

Specific data on normal monthly, seasonal, and annual temperature and precipitation are not available for the county, but figures shown

in table 1 for Old Town, Maine, in Penobscot County, are considered generally representative of areas along Penobscot Bay and other low-altitude areas.

Except for the hot spells in summer and a period in October or early November called Indian summer, the growing season is cool to moderately hot. Average temperatures range from 41.9° F. in April to 68.4° F. in July and then decline to 47.9° in October. The average winter temperature is 20°.

TABLE 1.—*Normal monthly, seasonal, and annual temperature and precipitation at Old Town, Penobscot County, Maine*

[Elevation, 108 feet]

Month	Temperature [1]			Precipitation [2]			
	Average	Absolute maximum	Absolute minimum	Average	Total for the driest year	Total for the wettest year	Average snowfall
	° *F.*	° *F.*	° *F.*	*Inches*	*Inches*	*Inches*	*Inches*
December	22. 7	59	−31	3. 26	2. 48	5. 83	16. 5
January	18. 0	53	−32	3. 17	1. 84	6. 80	18. 8
February	19. 5	51	−32	2. 60	1. 30	3. 21	20. 6
Winter	20. 0	59	−32	9. 03	5. 62	15. 84	55. 9
March	30. 6	73	−18	3. 05	4. 03	7. 21	10. 6
April	41. 9	89	0	3. 57	. 78	4. 78	4. 1
May	53. 8	92	26	2. 99	2. 74	3. 33	. 2
Spring	42. 1	92	−18	9. 61	7. 55	15. 32	14. 9
June	62. 9	95	34	3. 47	1. 80	3. 83	0
July	68. 4	96	43	3. 64	2. 35	3. 01	0
August	66. 2	93	36	3. 01	3. 06	1. 48	0
Summer	65. 8	96	34	10. 12	7. 21	8. 32	0
September	58. 2	92	28	3. 60	1. 59	3. 03	0
October	47. 9	84	15	4. 12	3. 66	5. 44	. 5
November	36. 0	70	1	3. 21	2. 93	2. 45	4. 4
Fall	47. 3	92	1	10. 93	8. 18	10. 92	4. 9
Year	43. 8	96	−32	39. 69	[3] 28. 56	[4] 50. 40	75. 7

[1] Average temperature based on 32-year record, 1918 to 1950; highest and lowest temperatures from 14-year record, 1916 to 1930.

[2] Average precipitation based on 37-year record, 1913 to 1950; wettest and driest years based on 38-year record, 1913 to 1950, inclusive; snowfall on 14-year record, 1916 to 1930.

[3] In 1941.

[4] In 1936.

Day temperatures in spring are usually in the fifties, and except for the hot spells, day temperatures in summer are in the seventies and eighties. Fall temperatures are generally higher than those of spring.

Early morning frosts occur in September and October, but damaging freezes frequently do not occur in daytime until well into November. The growing season for truck crops especially can be lengthened by protection from frosts, and tomatoes can be ripened on the vine in October when such protection is afforded. By use of protective methods against early morning frosts in fall, the average growing season of 140 to 150 days near the coast can be lengthened to 160 or 180 days, and the average for higher elevations inland can be extended from 130 or 140 days to about 150.

The average yearly precipitation of 39.69 inches is usually adequate for crop production and water-supply needs. Droughts occur occasionally, but drought conditions are evident on very gravelly or sandy soils regardless of the weather. Excessive precipitation rarely occurs, but occasional downpours cause floods in local areas.

Snowfall is surprisingly moderate in all except the areas of higher elevation. The heaviest snowfall is in January and February. Snow falls in November and April but warm spells melt it.

Wind velocities are not extreme, though sufficient to give good air drainage for orchards on rolling hills. Air currents are most pronounced near the ocean, where fairly strong offshore breezes are common. During winter, the prevailing winds are from the northwest in the western and southern parts of the county, and from the east or northeast in the other parts. In spring and summer wind direction is variable, but southeasterly winds predominate.

WATER SUPPLY

Water tables in almost all parts of the county are near enough to the surface to be tapped by wells 60 to 80 feet deep. Such wells maintain a supply of water adequate for average household needs. Where a considerable volume of water is required, deeper wells must be drilled, and some 160 feet deep or more are reported. In the exceptional areas of deep sand and gravel deposits, or on mountains where water seeps only along rock strata, wells also must be deeper. Self-flowing, or artesian, wells have not been developed. Springs are rather numerous. Many estates and summer homes have running water piped from springs on nearby hills or mountainsides.

Brooks and lakes are another source of supply, and water from many of these is pure enough for household use. Cottagers along many of the lakes obtain water by driving a pipe and filter some 10 to 25 feet into the ground and attaching a pump. A supply of water sufficient for their needs seeps through the filter and into the pipe.

Islesboro has springs and semipermanent brooks indicating a fairly high water table, but for household uses other than drinking and cooking, some residents of the island must collect rain water in barrels. The island has a public water system, however, and in all likelihood, this will be extended from Dark Harbor and North Islesboro to meet the needs of all residents. Other offshore islands of the county are not well supplied with good water.

VEGETATION

Woodland still covers more than 75 percent of the county, but all stands of timber have been cut over. Few trees of marketable size

remain. The general composition of the forest growth is that common to the northern forest region.

A mixed stand of northern hardwoods and conifers originally covered most of the mainland. The hemlock-birch-beech-maple association favored the high shallow ridges and areas of till; the spruce-pine-fir association the low-lying areas of silt and sand; and the oak-ash-hickory-maple association the high ridges of deep glacial till. Spruce and tamarack grew in the swamps.

Spruce, fir, hemlock, and birch once densely covered the offshore islands, but most of the timber has been cut for pulp, sawlogs, and cordwood. A good cover of spruce and fir with some pine still remains on parts of Islesboro, Job, Lasell, Ensign, and Seven Hundred Acre Islands. Some abandoned farms on these islands are rapidly reforesting to aspen, birch, and maple, as well as spruce and fir.

WILDLIFE

The extensive woodlands of the county were originally populated with a rather wide variety of wildlife—deer, bear, lynx, panther, and rabbit, grouse, and other small game and birds. Moose, duck, and geese were around the swamps. Some wildlife still exists in isolated parts of the county, but stringent game laws and conservation are necessary for its preservation. Such aids become increasingly important as roads and transportation to more inaccessible places are developed.

ORGANIZATION AND POPULATION

Waldo County was organized from part of Hancock County on February 7, 1827, and named for Brig. Gen. Samuel Waldo. The county was enlarged to its present size of 25 towns January 22, 1828, by incorporating parts of adjoining counties.

The first settlers arrived long before the county was organized (about 1731) and began clearing the forest land for farms. The area of earliest settlement, near the present site of Winterport, was then called the Muscongus Grants or Waldo Patent. Most of the settlers came from Germany, Ireland, and Scotland in response to advertisements made by Samuel Waldo during the years 1750 to 1770. These settlers moved farther up the coastal streams and rivers as the rate of settlement increased. A few groups of English and French moved in from the North and from New Hampshire by way of the Sebasticook and Penobscot Rivers, and a number of veterans of the Revolutionary War were given land grants in the area by Massachusetts, which then claimed the region.

Robert Miller led one group from Londonderry, N. H., to the present site of Belfast in 1770. The community they established was named after Belfast, Ireland, and incorporated June 22, 1773. The British destroyed the settlement in 1779, but it was reestablished 5 years later. In 1815 the British shelled and again partly destroyed Belfast, and partly because of these assaults, the community was slow in developing. Belfast and other communities gradually became established, and thriving businesses developed in cooperage, shipbuilding, farming, and woodworking. In 1845 part of Belfast and part of Prospect towns were incorporated with Searsport, and in 1853 the boundaries and present charter for the city of Belfast were established.

Census releases for 1950 list the population of the county at 21,687.

Belfast (pop. 5,960 in 1950), is the largest town and leading trading and manufacturing center. Other population centers are Winterport, Searsport, Unity, Thorndike, Lincolnville Center, Palermo, Prospect, Searsmont, Freedom, and Liberty.

INDUSTRIES

In the days of early settlement, lime kilns and iron smelters were established in many places along the coast in this county, but these were abandoned before the turn of the century. Other manufacturing plants replaced them and for a time furnished employment for a number of people and good local markets for farm products.

Manufacturing, processing of farm products, quarrying of stone and gravel, fishing, and minor enterprises, including cutting of cordwood and lumbering, still provide some employment. The processing and woodworking plants are near the farming and lumbering villages of Unity, Freedom, Liberty, and Brooks. Other manufacturing is confined to the coast or to rail or river outlets.

Most of the factories are in the city of Belfast, where there is a leatherboard plant, a shoe and a pants factory, a sardine cannery, and several woodworking plants. A factory in Freedom produces hardwood novelties. At Liberty, Brooks, Freedom, Unity, and other towns are plants for canning peas, beans, corn, and blueberries. Pea vining stations are located in each of these towns and at certain other small villages.

TRANSPORTATION

Buses, transport trucks, and trains provide public transportation, and marketing and distribution are facilitated by roads extending to almost all parts of the county. In 1950 all but 52 farms were reported to be within 5 miles of the nearest all-weather road. State and Federal highways connect most of the population centers. The trunk highways are kept free of snow during winter.

The main line of the Maine Central Railroad from Portland to Bangor touches the extreme northwestern part of the county at Burnham, and from there, a branch line, the Belfast and Moosehead Lake Railroad, passes diagonally through the county and serves the communities of Burnham, Unity, Thorndike, Knox, Brooks, Waldo, and Belfast. The Bangor and Aroostook Railroad Co. follows the Penobscot River Valley from Bangor south to Searsport and serves the northeastern communities of Winterport, Prospect, Sandy Point, and Stockton Springs.

A ferry carries cars and passengers from Lincolnville Beach to Islesboro by the way of Grindel Point Lighthouse, and a good system of roads is maintained on the island. Other islands in the bay are smaller and are reached only by private boat. Regular steamboat service is not provided between Belfast and other ports and landings on Penobscot Bay.

MARKETS

During the vacation season in Maine, farmers have an opportunity to supply eggs, milk, butter, truck crops, and small fruits for the summer trade. Additional supplies of these products are shipped in to supplement the produce raised locally. A greater part of the

produce needed for the vacation trade could be provided locally if more farmers started vegetables in glass-framed hotbeds. In so doing, the period of productivity could be advanced about 2 weeks. The bulk of the sweet corn, peas, beans, and other vegetables grown are sold to the canneries. In addition to the summer trade, there is a moderately active market for farm produce among workers in the small industries of the county.

CULTURAL DEVELOPMENTS AND IMPROVEMENTS

Most of the villages in the county are small. Many of the homes have electricity and running water, and the houses and buildings are neat and well kept. Many farm homes do not have running water, but nearly all have electricity and other modern conveniences. Rural power lines are being extended. In 1950, 1,667 farm dwellings were lighted by electricity, 921 had running water, and 1,222 had telephones.

All rural communities in the county have telephone service, but only a few homes in each community may be equipped. Many summer homes and estates, especially those on Islesboro, are thoroughly modernized and served by private electric, water, and telephone lines.

About a third of the farms have soils below normal in crop-yielding ability. On such farms the houses may be run down and poorly furnished, and fences and equipment are often poor. Some remote areas, as around Frye Mountain, have been entirely abandoned for farming because the soils are ledgy and unfavorable for crops.

Libraries are established in all the towns. The Belfast library is excellent and contains rather complete historical documents of the region. Other good though small libraries are at Islesboro, Searsport, Winterport, Unity, and other villages.

Churches are located in nearly all the villages, and many faiths are represented in the county. Congregational, Episcopal, Unitarian, and Roman Catholic are the leading denominations, and the Baptist, Methodist, and other faiths are represented by at least one church or chapel in the larger villages and the city of Belfast.

Grade schools are in all villages and towns and consolidated high schools are located in Belfast, Winterport, Unity, and Lincolnville.

AGRICULTURE

The Indians in the area now included in Waldo County cleared small fields along some of the creek and river bottoms and terraces near their villages and planted corn, squash, and beans; but for the most part, they left the woodlands undisturbed. The first white settlers began burning the forests to make room for farms and settlements.

The principal pioneer crops were corn, flax, oats, rye, squash and other vegetables, and later potatoes. The colonial farmer's chief concern was the providing of forage crops for his livestock. Horses, cattle, sheep, swine, and poultry were his sustenance, medium of exchange, and wealth. Vegetables for himself and forage for his livestock were the primary necessities, and every effort was made to increase yields by augmenting the original fertility in the soil with refuse from the house and stable. According to reports, the first yields were relatively high.

As settlements became more nearly stabilized, surplus crops and livestock were taken to nearby waterways, loaded on ships, carried

abroad or to other settlements, and exchanged for manufactured and finished goods. Colonial trade grew, and shipbuilding and other industry gradually developed along the waterways and on the coast. Local markets for farm produce were good, and later, demand for cured and processed farm products increased to such extent that farmers were encouraged to clear and cultivate all the land they could manage, regardless of the great tasks of removing the stones and preparing the ground for crops. The years of greatest agricultural advancement were between 1820 and 1870.

With the opening of the West to homesteaders and the failure of the poorest soils to maintain crop yields, the decline of farming in the county began. Not all of Waldo County was subjected to this decline, however, because the productivity of Bangor, Charlton, Melrose, and like soils could be maintained. Also, by trial and error, farmers discovered that their interests were best served on the Suffield, Hartland, Buxton, and other clay-derived soils if they established a dairy; grew clover and timothy hay, oats, and corn; and maintained good pastures. In other parts of the county, farmers learned that orchards could be established on the south-facing exposures of high hills where deep soils had developed on well-drained tills, and the raising of apples became well established. More recently the summer vacation trade has improved the local markets for truck crops and other products.

CROPS[2]

The leading crops of the county are: (1) Hay, oats, corn, and barley grown for grain and forage; (2) potatoes; and (3) sweet corn, beans, peas, other vegetables, and fruits for commercial canning. Nearly all farmers diversify their crops, and all except one or two large potato growers produce hay, corn, oats, and potatoes, as well as the canning vegetables. The acreage of principal crops and number of bearing fruit trees and grapevines in the county are shown in table 2 for stated years.

Hay is far the leading crop in acreage. Clover and timothy alone or mixed, alfalfa, other tame hay, and volunteer or wild hay are grown. Wild hay is composed of fescues, foxtail, redtop, oatgrasses, and Kentucky bluegrass. Oats, the leading small-grain crop, are usually harvested for grain but are sometimes cut green for hay. The common practice is to cut and shock the oats and thresh in the field, but the use of combines is increasing. Field corn is cut and shocked in the field and later husked.

The principal canning crops—sweet corn, beans, and peas—are grown on general and dairy farms in Unity, Freedom, Thorndike, Palermo, and other central, western, and northern towns (townships) of the county. The canning corn is mostly hybrid.

The canning crops are produced under contract with the canning companies. Sweet corn, string beans, and other canning crops are taken directly to the canneries at harvesting. The peas are first shelled at the nearest vinery and then hauled to the cannery.

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[2] For suggested soil uses, planting and harvesting dates, and general management practices for principal crops see Use and Management, p. 99.

TABLE 2.—*Acreage of principal crops and number of fruit trees and grapevines of bearing age in Waldo County, Maine, in stated years*

Crop	1929		1949
Cereals:	*Acres*	*Acres*	*Acres*
Corn for grain	17	232	59
Oats threshed	1, 585	1, 818	845
Barley threshed	56	34	8
Hay, total	63, 571	57, 447	39, 096
Clover and timothy alone or mixed	27, 062	25, 006	18, 823
Alfalfa	193	28	546
Small-grain hay	183	462	688
Other tame hay	36, 066	30, 763	19, 039
Wild hay	127	1, 188	(1)
Potatoes for sale or home use	2, 500	2, 104	[2] 1, 316
Vegetables harvested for sale:			
Peas (green)	331	200	447
Sweet corn	1, 137	437	1, 047
Green beans (snap, string, or wax)	179	95	185
Dry beans	717	1, 120	966
Small fruits:			
Strawberries	43	60	24
Raspberries	31	46	11
Blackberries and dewberries	14	2	(1)
Blueberries	471	1, 239	1, 315
	Number	*Number*	*Number*
Apple trees	143, 193	54, 908	41, 731
Cherry do	371	104	171
Pear do	669	241	430
Plum and prune do	913	290	555
Grapevines	66	52	430

[1] Not reported.
[2] Does not include acres for farms with less than 15 bushels harvested.

The chief potato varieties are Green Mountain, Katahdin, Irish Cobbler, and Chippewa. The crop is usually dug with mechanical diggers. Nearly 75 percent of the farmers store the crop, regardless of market conditions at harvest time.

Apples are far the most important orchard crop. McIntosh, Cortland, and Delicious are the most important varieties grown. The orchards are mainly in the towns of Winterport, Lincolnville, Monroe, Belfast, and Swanville. Late apples are shipped; the early varieties are sold locally.

Blueberries are a crop worthy of special mention because they grow extensively on wasteland. The mountain or hill slopes in over half the towns of the county have patches of blueberries. Lincolnville, Northport, Searsmont, Liberty, Montville, Palermo, Prospect, and Stockton Springs are probably the leading towns in blueberry acreage.

LIVESTOCK AND LIVESTOCK PRODUCTS

Dairy cattle are an important source of income in the county. The leading breeds at the time of survey were Holstein-Friesian, Jersey, and Guernsey. Most herds are somewhat mixed and may include a few beef cattle, principally Herefords. Effort is being made to im-

prove the stock and increase milk production. The Central Maine Artificial Breeders Association serviced nearly 80 herds at the time of survey. Cows milked totaled nearly 55 percent of all cattle in the county in 1950. Fluid milk and butterfat are sold mainly to Boston wholesalers. In 1949, 28,052,048 pounds of whole milk and 14,679 pounds of butterfat were sold. A little less than half the butter churned in the county is used in homes. Cheese is made mainly for home use, and little is sold.

Poultry raising, based largely on production of broilers and hatching eggs for sale, is next to dairying in importance. In 1950 there were 255,242 chickens over 4 months old on farms, and in 1949 there were 2,560,532 dozen eggs sold. Barred Plymouth Rocks and Rhode Island Reds are the main breeds. Large-scale poultry raisers ordinarily do not attempt other farming; they purchase nearly all feeds and concentrates.

Horses, swine, and sheep are other livestock raised. Swine are produced mainly for home use, and a sow or two is kept on nearly every farm. Chester Whites are predominant but there are a few Berkshires and Poland Chinas. Flocks of 30 to not more than 75 head of sheep are kept principally on general farms. The wool is usually sold to traveling buyers. Oxford, Southdown, Shropshire, and some Cheviot are the principal breeds of sheep. The number of horses, cattle, swine, and other livestock on farms is shown in table 3 for stated years.

TABLE 3.—*Livestock on farms in Waldo County, Maine, for stated years*

Livestock	1930	1940	1950
	Number	*Number*	*Number*
Horses and colts	3, 380	[1] 2, 095	1, 506
Cattle and calves	15, 892	[1] 13, 295	12, 406
Sheep and lambs	4, 925	[2] 1, 737	1, 218
Hogs and pigs	1, 648	[3] 1, 196	823
Chickens	[3] 111, 804	[3] 112, 409	[3] 255, 242

[1] Over 3 months old. [2] Over 6 months old. [3] Over 4 months old.

LAND USE

Land in farms amounted to 249,407 acres, or 53.1 percent of the county, in 1950. A total of 68,900 acres, or 27.6 percent of the land in farms, was cropland; 121,411 acres, or 48.7 percent, woodland not pastured; and 43,664 acres, or 17.5 percent, woodland and other land pastured. All other land in farms totaled 15,432 acres, or 6.2 percent.

TYPE, SIZE, AND TENURE OF FARMS

Classified according to type, there were 366 poultry farms in the county in 1950, 346 dairy, 109 general, 43 fruit-and-nut, 38 field crop, 33 livestock, 5 vegetable, and 1,019 miscellaneous and unclassified farms.

The average size of farms in 1950 was 127.3 acres. In that year 260 farms contained less than 30 acres; 681, from 30 to 99 acres; 592, from

100 to 179 acres; 245, from 180 to 259 acres; 152, from 260 to 499 acres; 27, from 500 to 999 acres; and 2 contained more than 1,000 acres.

In 1950, 1,783 farms, or 91.0 percent of all farms, were operated by full owners; 126 farms, or 6.4 percent, by part owners; 46 farms, or 2.4 percent, by tenants; and 4 farms, or 0.2 percent, by managers.

FARM MACHINERY AND EQUIPMENT

The farms are rather well-equipped, especially in the Knox-Unity area. In 1950, 725 farms reported 813 tractors, 828 farms reported 921 motortrucks, and 1,232 farms reported 1,372 automobiles. About half the tractors are home-made from old automobiles.

The heavier farm equipment, such as trucks and horse- or power-operated diggers and sprayers, is usually used in potato growing, but planters, plows, and harrows are common on all farms. There are few cultipackers. One-horse dump hay rakes are predominant, but some side-delivery rakes are used. Hay loaders are rare. Milking machines are used on many dairy farms, and the number is increasing. Few farms are equipped with feed grinders because so much feed is bought as commercial concentrates.

SOIL SURVEY METHODS AND DEFINITIONS

Soil surveying consists of the examination, classification, and mapping of soils in the field. The soil scientist walks over the area at intervals not more than one-quarter mile apart and bores holes into the soil with an auger or digs them with a spade. He also examines road cuts and similar exposures. Each excavation exposes a series of layers, or horizons, called collectively the soil profile. Each of these layers, as well as the parent material beneath the soil, is studied carefully, and the color, texture, structure, porosity, consistence, and content of organic matter, roots, gravel, and stone are noted. The reaction [3] of the soil and its content of lime and salts are determined by simple tests. The presence of lime in the soil is detected by the use of a dilute solution of hydrochloric acid. The drainage, both internal and external, and other external features, as the relief or lay of the land, are taken into consideration, and the interrelation of soil and vegetation is studied.

By color and the various other characteristics just mentioned, the scientist learns the nature of the soil. The darkness of the topmost layer in a soil profile is usually related to the quantity of organic matter it contains. Streaks and spots of gray, yellow, and brown in lower layers generally indicate poor drainage and poor aeration. Texture—the content of sand, silt, and clay—is determined by the way the soil feels to the touch, and is later checked by mechanical analysis in the laboratory. Texture has much to do with the quantity of moisture a

[3] The reaction of a soil is its degree of acidity or alkalinity expressed mathematically as the pH value. A pH value of 7 indicates precise neutrality; higher values, alkalinity; and lower values, acidity. Terms commonly used in referring to reaction in this report are defined as follows:

	pH value		*pH value*
Very strongly acid	4.5–5.0	Slightly acid	6.1–6.5
Strongly acid	5.1–5.5	Neutral	6.6–7.3
Medium acid	5.6–6.0	Alkaline	above 7.3

soil will hold available for plants; the ease or difficulty with which the soil may be cultivated; and the extent to which plant nutrients, or fertilizers, will leach out or be held in a form available for plants. Structure, or the way the soil granulates and the amount of pores or open spaces between particles, indicates how easily plant roots penetrate the soil and water enters it and how difficult a soil will be to keep open and porous under cultivation. The parent material, or kind of rock material, from which a soil developed affects the quantity and kind of plant nutrients the soil may have naturally.

The soils are classified according to their characteristics, both internal and external, with special emphasis upon the features that influence the adaptation of the land for the growing of crop plants, grasses, and trees. On the basis of these characteristics, they are grouped into classification units, the principal three of which are (1) series, (2) type, and (3) phase; some areas—as Rough Stony land (Canaan soil material) and Rock outcrop—are called (4) miscellaneous land types.

When two or more kinds of soil are so intricately mixed that they cannot be shown separately on a map of the scale used, they are mapped together and the areas of mixture are called a soil complex. Buxton-Biddeford stony silty clay loams is a complex of Buxton stony silty clay loam and Biddeford stony silty clay loam occurring in this county.

The series is a group of soils having the same genetic horizons, similar in important characteristics, arrangement in the profile, and parent material. Thus, the series comprises soils having essentially the same color, structure, natural drainage, and other important internal characteristics, and the same range in relief. The series are given geographic names taken from localities near which they were first identified. Hermon, Hollis, Paxton, Bangor, Canaan, and Thorndike are names of important soil series in Waldo County.

One or more soil types make up a soil series. Soil types are defined according to the texture of the upper part of the soil, or that part commonly plowed. Thus, the class name of this texture, as loam, sand, loamy sand, sandy loam, silt loam, clay loam, silty clay loam, or clay, is added to the series name to give the complete name of the soil type. For example, Hermon fine sandy loam and Hollis loam are names of soil types within the Hermon and Hollis series, respectively. In addition to being members of different series, these two soils differ in texture of surface soil, as their names show.

A phase is a subdivision of a soil type. A soil type will be broken into phases primarily because of differences other than those of kind, thickness, and arrangement of layers. Differences in relief, stoniness, and degree of accelerated erosion may be shown as phases. For example, Hollis loam is divided into five phases in this county because some of it is undulating, some is sloping, some is steep, and some on sloping and steep relief is eroded. The five phases are therefore Hollis loam, sloping phase; Hollis loam, steep phase; Hollis loam, eroded sloping phase; Hollis loam, eroded steep phase; and Hollis loam (the normal phase), which is undulating.

The soil type or, where it is subdivided, the soil phase, is the unit of mapping used in soil surveys. Because these units are more nearly uniform than the series and other broader groups or classes of soils, more definite statements about the use and management of soils be-

longing to them can be made. One can say, for example, that soils of the Hollis series are very strongly acid and require relatively large applications of lime for best results with most crops. More specifically it can be said that Hollis loam (the normal phase) has mild slopes and is suited to intensive cultivation; or that the steep phase of Hollis loam has slopes falling more than 16 feet in 100 feet of distance, erodes easily where tilled, and is better suited to orchards, pasture, or forest than to row crops.

SOILS

SOIL SERIES, TYPES,[1] AND PHASES

In the following pages the soil series, types, phases, complexes, and miscellaneous land types are described in detail and their agricultural relations are discussed. The location and distribution of types, phases, complexes, and land types are shown on the accompanying map, and the approximate acreage and proportionate extent are given in table 4.

TABLE 4.—*Approximate acreage and proportionate extent of the soils mapped in Waldo County, Maine*

Soil	Acres	Percent	Soil	Acres	Percent
Acton loam	580	0.1	Canaan loam	346	0.1
Sloping phase	98	(1)	Sloping phase	159	(1)
Acton stony loam	3,220	.7	Steep phase	31	(1)
Sloping phase	1,522	.3	Canaan stony loam	17,321	3.7
Adams fine sandy loam	257	.1	Canaan very stony loam	1,544	.3
Adams loamy fine sand	518	.1	Hilly phase	7,552	1.6
Steep phase	516	.1	Charlton gravelly fine sandy loam	5,298	1.1
Agawam loamy very fine sand	640	.2	Rolling phase	3,722	.8
Alluvial soils, undifferentiated	1,428	.3	Charlton loam	10,368	2.2
Balch peat	1,744	.4	Eroded sloping phase	1,423	.3
Bangor gravelly silt loam	1,042	.2	Eroded steep phase	357	.1
Eroded sloping phase	271	.1	Sloping phase	4,145	.9
Sloping phase	510	.1	Steep phase	517	.1
Steep phase	49	(1)	Charlton stony loam	18,610	4.0
Bangor-Hartland stony complex	3,153	.7	Steep phase	2,422	.5
Bangor silt loam	3,522	.8	Undulating phase	9,910	2.1
Moderately eroded phase	1,173	.2	Coastal beach	468	.1
Sloping phase	2,835	.6	Colrain loam	145	(1)
Steep phase	236	.1	Rolling phase	194	(1)
Bangor stony silt loam	4,313	.9	Steep phase	15	(1)
Smooth phase	4,276	.9	Colrain stony loam	573	.1
Steep phase	960	.2	Steep phase	165	(1)
Biddeford silt loam	18,586	4.0	Undulating phase	190	(1)
Burnham silt loam	313	.1	Dixmont loam	2,535	.5
Burnham stony silt loam	9,924	2.1	Sloping phase	236	.1
Buxton-Biddeford stony silty clay loams	5,050	1.1	Dixmont stony loam	11,899	2.5
Buxton silt loam	8,725	1.9	Sloping phase	2,029	.4
			Etna fine sandy loam	1,941	.4
			Etna gravelly sandy loam	2,837	.6
			Hilly phase	1,299	.3

See footnote at end of table.

[1] When a soil type is subdivided into phases, that part of the type having no phase name is considered the normal phase of the type.

TABLE 4.—*Approximate acreage and proportionate extent of the soils mapped in Waldo County, Maine*—Continued

Soil	Acres	Percent
Etna-Hartland very fine sandy loams	1,123	0.2
Eroded hilly phases	346	.1
Eroded phases	493	.1
Hilly phases	901	.2
Etna loamy sand	2,938	.6
Hilly phase	526	.1
Fresh water marsh	1,043	.2
Greenwood peat	171	(1)
Hartland fine sandy loam	897	.2
Severely eroded phase	347	.1
Severely eroded steep phase	21	(1)
Steep phase	253	.1
Hartland silt loam	1,769	.4
Eroded phase	2,379	.5
Severely eroded steep phase	2,042	.4
Steep phase	3,507	.7
Hermon fine sandy loam	2,327	.5
Eroded sloping phase	207	(1)
Sloping phase	1,073	.2
Steep phase	237	.1
Hermon stony fine sandy loam	3,815	.8
Undulating phase	1,564	.3
Hermon very stony fine sandy loam	5,260	1.1
Hinsdale gravelly sandy loam, rolling phase	23	(1)
Hinsdale stony sandy loam	204	(1)
Hilly phase	96	(1)
Hollis gravelly loam	220	(1)
Sloping phase	210	(1)
Hollis loam	1,976	.4
Eroded sloping phase	485	.1
Eroded steep phase	218	(1)
Sloping phase	1,730	.4
Steep phase	129	(1)
Hollis stony loam	9,112	1.9
Littlefield peat	9,041	1.9
Melrose fine sandy loam	160	(1)
Undulating phase	907	.2
Ondawa fine sandy loam	297	.1
Paxton loam	5,279	1.1
Eroded sloping phase	1,367	.3
Eroded steep phase	626	.2
Sloping phase	6,946	1.5
Steep phase	1,215	.3
Paxton stony loam	9,508	2.0
Steep phase	9,346	2.0
Undulating phase	2,565	.5
Podunk fine sandy loam	739	.2
Rock outcrop	1,388	.3
Rough stony land:		
Canaan soil material	4,075	.9
Paxton soil material	7,085	1.5
Thorndike soil material	1,843	.4
Westford soil material	5,487	1.2
Rumney loam	4,506	1.0
Saco silt loam	429	.1
Saco silty clay loam	2,576	.5
Scarboro fine sandy loam	5,204	1.1
Shapleigh loam	2,095	.4
Sloping phase	1,757	.4
Steep phase	342	.1
Stetson fine sandy loam	3,327	.7
Stetson gravelly sandy loam	2,292	.5
Steep phase	201	(1)
Stetson loamy sand	798	.2
Stetson-Suffield very fine sandy loams	511	.1
Sudbury fine sandy loam	3,183	.7
Suffield fine sandy loam	2,118	.5
Eroded phase	392	.1
Suffield silt loam	5,866	1.2
Eroded phase	1,514	.3
Severely eroded phase	11	(1)
Sutton loam	6,050	1.3
Sloping phase	942	.2
Sutton stony loam	22,054	4.7
Shallow phase	4,851	1.0
Sloping phase	7,506	1.6
Sutton very stony loam	3,730	.8
Thorndike gravelly silt loam	641	.2
Hilly phase	304	.1
Rolling phase	617	.2
Thorndike silt loam	3,988	.8
Eroded hilly phase	406	.1
Eroded sloping phase	2,702	.6
Hilly phase	156	(1)
Moderately eroded phase	623	.2
Sloping phase	1,524	.3
Thorndike stony silt loam	18,055	3.8
Hilly phase	5,153	1.1
Tidal marsh	372	.1
Waterboro muck	6,614	1.5
Westford stony loam	5,488	1.2
Westford very stony loam	8,404	1.8
Whitman loam	1,553	.3
Whitman stony loam	28,448	6.1
Whitman very stony loam	3,229	.7
Total	469,760	100.0

[1] Less than 0.1 percent.

ACTON SERIES

Soils of the Acton series are dark brown to dark grayish brown, deep, friable, acid, and imperfectly drained. Their subsoil is brownish yellow to yellow and somewhat mottled. The soils have developed on deep granitic till, are associated primarily with the well-drained Hermon and Canaan soils, and occupy nearly level to gently sloping ridges with slopes of not more than 16 percent. The Acton soils are similar in drainage to the Sutton soils, which developed on gneissic and schistose till; and to the Dixmont, from limy schist, calcareous phyllite, and slate till. The Acton soils are probably the least extensive of those just named; they are restricted to prominent areas around Swan Lake and Mount Waldo.

Most of the Acton soils are either timbered or in permanent pasture, but there are some hay meadows and a few cultivated fields used for corn, oats, beans, and peas. Acton loam; Acton loam, sloping phase; Acton stony loam; and Acton stony loam, sloping phase, occur in the county.

Acton loam (0–8% slopes) (AA).—This is a mellow stone-cleared acid imperfectly drained soil. It occurs in fairly regular small bodies on smooth nearly level to gently sloping relief. Areas are associated primarily with the Hermon soils and, to lesser extent, with the Canaan, and are generally confined to the northeastern and north-central parts of the county.

The following is a representative profile observed in a cultivated area:

0 to 8 inches, dark grayish-brown mellow loam.
8 to 18 inches, yellowish-brown firm but friable loam.
18 to 24 inches, pale-yellow firm loam slightly mottled with gray.
24 to 36 inches, mottled gray, yellow, and brown compact gritty till; contains angular and subangular granitic boulders.
36 inches +, gray semisaturated till.

All layers of the profile are strongly acid. In profile characteristics this and other imperfectly drained soils are more variable than those that are well drained. This soil is less variable, however, than comparable members of the Sutton and Dixmont series.

Approximately 10 percent of the Acton loam is used for corn, oats, beans, and peas; the rest is particularly well-suited to hay and pasture, as it supports good stands of grass (pl. 1, *A*). Cultivated crops other than orchards may grow well, provided there is not a large quantity of free water in the soil for long periods. Orchards, even those on higher slopes, usually die out rapidly, presumably because of poor aeration around the tree roots. On the lesser slopes, also, the air drainage necessary for orchards may be lacking.

Acton loam, sloping phase (8–16% slopes) (AB).—This soil is similar to the normal phase in essential profile characteristics, but it is more strongly sloping and has a few more scattered granite stones on the surface. By reason of the stronger slopes, it is also more susceptible to erosion when cultivated.

Practically all of this soil is cleared. Nearly 80 percent is in permanent pastures or hay meadows, and the rest is cultivated. Accelerated erosion is negligible where the land is in pasture or meadows. Most of the serious erosion has been caused by careless tillage of the cultivated areas.

Acton stony loam (0–8% slopes) (Ac).—This is a deep imperfectly drained acid soil occurring on nearly level to gently sloping relief and having pronounced surface stoniness. The small fairly regular bodies are distributed mostly around Swan Lake and Mount Waldo, primarily in association with Hermon and Canaan soils. Some rounded granitic stones and a few boulders are scattered on the surface. These stones are 15 to 20 inches in diameter in most places, though larger ones may occur near areas of rough stony land or other very stony soils.

This soil differs somewhat from Acton loam, as it has a more distinctive dark-brown or black surface layer underlain by a more pronounced whitish or leached layer. This difference is due to the fact that this soil is under forest and undisturbed; whereas Acton loam, though now largely under grass, has probably been cultivated at some time. Cultivation would mix the surface layers and probably cause some loss of organic matter.

The following describes a representative profile of Acton stony loam in a forested area:

0 to 3 inches, dark-brown mixed organic matter and mineral material.
3 to 5 inches, grayish-brown mellow loam with a soft crumb structure.
5 to 10 inches, yellowish-brown firm but friable loam.
10 to 18 inches, pale-yellow firm loam faintly mottled with gray.
18 to 30 inches, mottled gray, yellow, and brown slightly compact gritty loam.
30 inches +, slightly compact gray gritty granitic till.

The entire profile is strongly acid and contains gravelly and bouldery granitic material. In some areas this soil resembles Whitman stony loam in profile characteristics, but it does not have the tussocky surface characteristic of poorly drained Whitman soil.

Approximately 80 percent of Acton stony loam is in woodland; the rest is in permanent pastures (pl. 1, *B*). The soil usually supports good stands of mixed northern softwoods and hardwoods, principally birch, maple, fir, hemlock, and spruce. Lumbering may be somewhat difficult in spring, as the land may then be soggy. Timber can be removed easily in winter when the soil is frozen.

Acton stony loam, sloping phase (8–16% slopes) (Ad).—In essential profile characteristics this soil is similar to the normal phase; it differs in having stronger slopes. In addition, because seepage areas occur more frequently in this phase, mottling is at shallower depths, or within 7 to 8 inches of the surface. The water table is always below depths of 24 or 30 inches. This phase is somewhat more stony than the normal phase, particularly where it occurs along drainageways, and it includes some ledge outcrops.

Acton stony loam occupies small fairly regular bodies along the slopes of mountains and ridges in association with Hermon and Canaan soils and is distributed in the vicinity of Swan Lake and Mount Waldo. It is usually wooded. Approximately 90 percent of the land supports good stands of mixed northern hardwoods and conifers, incuding hemlock, spruce, and maple. The rest is in permanent pasture.

ADAMS SERIES

Soils of the Adams series are on smooth glacial outwash terraces having nearly level to undulating relief. To depths of 4 to 6 feet they are composed of partly stratified sands. Marine or lacustrine clay is

usually beneath the sand. Stones, gravel, or very coarse sands are very rare. Coarser material usually appears in a few transitional areas next to soils of the Stetson, Etna, and other series derived from coarse material.

Soil of the Adams series is generally yellowish brown, pale yellow, and gray from the surface downward. It is strongly leached and has a pronounced 3- or 4-inch ashy gray layer near the surface in wooded areas. Above the leached layer is usually a black one, and below it a reddish-brown one slightly hard or semi-indurated (pl. 2, *A*).

Like other smooth outwash soils, the Adams are not subject to erosion. Scattered bodies of Adams soil occur throughout the central part of the county and include a few small areas of other outwash and sandy marine clay soils such as Suffield fine sandy loam.

Adams fine sandy loam, Adams loamy fine sand, and the steep phase of Adams loamy fine sand are the members of the Adams series in this county.

Adams fine sandy loam (0–3% slopes) (AE).—This inextensive soil is usually limited to narrow bands close to the larger streams and lakes of the county. Erosion is not a problem.

The soil is strongly leached and has a pronounced light-gray layer 3 or 4 inches thick. Areas of this soil are associated primarily with those of well-drained Melrose and Stetson soils, imperfectly drained Sudbury soils, and poorly drained Scarboro soil on outwash or stream terraces.

The following describes a profile in a cultivated field:

0 to 4 inches, very dark-brown and very friable fine sandy loam; strongly acid.
4 to 6 inches, light-gray loose fine sand; strongly acid.
6 to 9 inches, dark yellowish-brown and semi-indurated (hard) sandy loam; material is displaced with some difficulty but readily breaks into small hard and brittle pieces; medium acid.
9 to 30 inches, yellowish-brown loose loamy fine sand; acid.
30 to 48 inches, brownish-yellow, grading into a pale-yellow or gray, loose sand or fine sand; acid.
48 inches to undetermined depth, faintly mottled gray and pale-yellow very firm clay or sandy clay; moderately to slightly acid.

The preceding profile has only a trace of the light-gray layer characteristic of Adams fine sandy loam. Variations from the profile described occur in depth to the clay and in abruptness of the change from sand to clay in the lower part. Included with this soil in mapping are a few areas where the clay is within 28 inches of the surface; a few others where ledges occur beneath the sand; and several small wet areas less than 2 acres in extent.

At least 80 percent of Adams fine sandy loam is cultivated (pl. 2, *B*). The principal crops are corn, field and canning beans, peas, and potatoes. Yields are fairly high, though some areas are droughty.

Adams loamy fine sand (3–8% slopes) (AF).—In most respects this soil is similar to Adams fine sandy loam. The difference is mainly in texture, though this soil has a slightly more billowy relief. It occurs in rather long narrow bands in the central and western parts of the county near the large streams and lakes. It is associated primarily with Stetson and Melrose soils and, to lesser extent, with some members of the Etna series. One or two small areas near Thorndike have been subject to wind erosion.

The profile described in the following has a pronouncedly leached light-gray layer and was taken in a forested area:

0 to 4 inches, dark yellowish-brown loose loamy fine sand; acid.
4 to 7 inches, light-gray loose loamy fine sand; acid.
7 to 10 inches, strongly yellowish-brown slightly indurated loamy fine sand; moderately acid.
10 to 24 inches, yellowish-brown slightly compact fine sand; acid.
24 to 40 inches, yellow-and-gray speckled loose fine sand; acid.
40 to 96 inches, gray-and-yellow speckled alternating layers of coarse and fine sand.
96 inches +, pale yellowish-gray very fine sandy clay underlain by gray clay to a depth of 15 feet or more; moderately to slightly acid.

The depth to the clay and the coarseness of the sandy subsoil vary somewhat, but in general the areas are rather uniform.

Cultivation is limited to about 10 percent of Adams loamy fine sand; 60 percent is in pasture, and 30 percent is forested. Yields are somewhat lower than on Adams fine sandy loam because of droughtiness.

Adams loamy fine sand, steep phase (20–40% slopes) (AG).—Though similar to the normal phase in most respects, this soil occupies terrace escarpments along drainageways and streams where slopes range from 16 to 50 percent but are dominantly between 20 and 40 percent. Areas also occur on steeply sloping terrace escarpments of fine sand underlain by clay—escarpments that include some small steep tracts of Hartland and Melrose fine sandy loams. The phase is associated primarily with those fine sandy loams and with the Stetson and Etna soils.

The profile of this soil is similar to that described for Adams loamy fine sand, but the sandy covering may be very shallow because slopes are so steep, and at the base of many slopes clay or silt is exposed. Variations in drainage, texture, and erosion are characteristic of this soil. Noticeably eroded spots occur in some pastured or tilled areas. Most of the land is timbered, and there are good growths of white pine, hemlock, spruce, oak, and poplar.

AGAWAM SERIES

The soil of the Agawam series is confined to the well-drained narrow benches of sand and gravel formed by the present river systems. The benches, or terraces, are primarily sandy, though there are some small gravelly deposits that are adjacent either to outwash deposits on rougher relief or to the stony uplands. The Agawam soil is more frequently associated with the Ondawa and Podunk soils of the bottom lands and the Stetson soils on terracelike positions than it is with upland soils. The Agawam differs from the Ondawa and Podunk soils in being subject to stream overflow only during intervals of very high water that occur about once in a decade. Agawam soil is similar to Stetson soils in having generally level relief but does not have the stratified layers of gravel in the substratum. The Agawam and Stetson soils, however, have developed from mixed materials containing limy quartzite, slate, gneiss, and some granite. Agawam loamy very fine sand is the only member of the Agawam series mapped in the county.

Agawam loamy very fine sand (0–3% slopes) (AH).—Rather narrow bands and irregular broad areas of this soil occur principally

near the rivers of the central and western parts of the county and along the inlets and outlets of lakes. The soil developed principally from mixed sands of schist, limy materials, and gneiss. Some areas contain gravel, and a number of these include granitic materials as well. The relief is generally nearly level. Because of this relief and excellent internal drainage, the soil is not subject to erosion when cultivated.

The following describes a profile in a pastured field:

0 to 10 inches, brown mellow very fine sand only slightly cohesive.
10 to 20 inches, strong yellowish-brown fine sand; slightly compact when wet but little coherence when dry.
20 to 38 inches, pale-yellow green-tinged sand; slightly compact when wet, little coherence when dry.
38 inches +, olive to pale-olive fine sand; slightly compact when wet, little coherence when dry.

All layers of the preceding profile are moderately acid. The profile is representative of most areas of the soil, but because of differences in origin, some bodies vary. The most noticeable variations are in the content of gravel and the texture of the surface soil. Also included in mapping are some very steep slopes where streams have cut into the soil.

About 10 percent of Agawam loamy very fine sand is cultivated to the general crops of the county; the rest is in pasture and hay, or in timber of white pine, hemlock, fir, and maple, with a scattering of elm, willow, and birch. The soil is not now cultivated to any extent but is well suited to cultivated crops. Yields are generally good. If a 3-year rotation of grain, clover and timothy hay, and a cultivated crop is used, estimated acre yields are 15 to 30 bushels of field beans, 30 to 40 bushels of oats, about 250 bushels of potatoes, 5 to 7 tons of sweet corn, and 10 to 15 tons of silage corn. Lime and fertilizer are needed.

ALLUVIAL SOILS, UNDIFFERENTIATED

Alluvial soils, undifferentiated (Ak) (0–3% slopes) are confined generally to small stream bottoms and imperfectly to poorly drained areas on the first bottoms of larger streams. The land is not subject to erosion. The soils are associated for the most part with Podunk fine sandy loam but are also mapped in association with Saco and Ondawa soils.

The soils of this separation are extremely irregular and range in texture from silt loam to a gravelly sand. They are characterized by more or less imperfect to poor drainage and frequent stream inundation and consist largely of mixtures of sand, silt, gravel and, in marshy places, some organic material. The streams deposit fresh alluvium yearly; therefore normal profile characteristics have not developed. The surface layers are usually dark-brown loams to sands, and the subsoils are mottled gray, yellow, and brown sandy clays to coarse sands. In a few places the subsoil layers are gravel.

This land is generally wooded, but some areas occurring in wide cleared or cultivated bottom land are pastured or in hay. The wooded areas usually support rather rank growths of larch, willow, alder, hemlock, spruce, birch, maple, elm, and rushes, sedges, and other hydrophytic plants. The pastured areas have a scattering of elm and maple trees and rather poor patches of grass, chiefly poverty oatgrass (*Donthonia spicata*). None of the land is cultivated.

BALCH SERIES

The soil of the Balch series occurs on saturated level deposits of woody and herbaceous organic materials that fill many of the old lakes and depressions. Slopes are never greater than 2 percent, and the organic material is predominantly woody. The series is associated with other organic and poorly drained soils, chiefly Waterboro muck, Littlefield and Greenwood peats, and the Scarboro soil. Balch peat is similar to all these soils in being saturated to the surface, but differs from the Scarboro in having organic instead of mineral matter in the profile, and from the other organic soils in coarseness and woodiness of the deposits. Balch soil usually occurs in large and small rounded or elliptical areas in the lowlands. It is most frequently along remnantal glacial waterways through the central and northwestern parts of the county. Balch peat is the only member of the series mapped.

Balch peat (0–2% slopes) (Ba).—This soil occurs in nearly all the ancient lakes and marshes that contain a considerable deposit of partially decayed larch, spruce, and other woody and herbaceous material. Whole logs and dead trees are often buried in this peat, as well as stumps and other coarse material. The peat is usually brown throughout and may be as much as 20 feet deep. Of the bogs actually sounded, one was 8 feet, one 13, and one 15 feet deep within 200 yards of the margins. Other bogs were tested with an 8-foot pole and were at least 8 feet deep. Two Balch peat bogs were sounded and corings were made; the material taken in the corings is described as follows:

0 to 7 inches, black moist granular muck matted with roots, twigs, and remains of herbaceous plants; very acid.
7 inches to 4 feet, brown somewhat compact moderately coarse woody peat containing partially decomposed limbs of trees and herbaceous plants; very acid and saturated.
4 to 7 feet, porous saturated brown coarse woody peat containing logs, stumps, and other tree remains; very acid.
7 to 10 feet, slightly compact brown fibrous and sedimentary peat from sedges, rushes, and wood.
10 to 13 feet, compact brown finely divided sedimentary woody peat underlain by sand or silt.

Most of Balch peat supported fairly good mixed stands of larch (tamarack), white cedar, and heath bushes or nearly pure stands of black spruce. One such bog near Sheepscot Pond still has an exceptionally dense stand of black spruce. Along Quantabacook Pond and other smaller ponds, larch and cedar appear as often as the spruce.

Although Balch peat bogs are ordinarily wasteland, some pulpwood and marketable timber can be obtained from them during the winter freeze-up. The timber is limited to black spruce, larch, and some white pine, fir, spruce, hemlock, and maple. With careful management frequent cuttings can be made. Some care must be exercised to prevent fires, especially in the woody Balch peat bogs, because they dry out rapidly when cut over. If the bogs are ever drained, ditches should be closed during dry spells to retain moisture and prevent fires. Once fires start in a deep bog, only extended wet weather will stop them.

BANGOR SERIES

Soils of the Bangor series have some characteristics in common with the Paxton and Charlton. They developed, however, from a

deep till containing many tiny flat fragments of hard, black, slatelike rock, chiefly calcareous quartzite, phyllite, slate, and some shale. Much of this rock material effervesces when acid is applied, but the fine material in the till is strongly acid. The till is somewhat compact, and though similar to the till under Paxton soils, is unlike it in being rather pervious to water and not so markedly laminated. Bangor soils are lighter colored than the Paxton. Also, the colors of their profiles in general, and of the underlying till in particular, are paler than those of the Charlton.

In texture, Bangor soils range between the rather narrow limits of gritty loam and silt loam. In areas transitional between the Bangor and the Paxton or Charlton soils, there may be some of the characteristics of all three series, but each of the transitional areas is classified and shown on the map as belonging to the predominant series.

Bangor soils occur mostly on very broad-topped undulating to sloping ridges of deep glacial till that have rather long slopes along drainage channels (pl. 3, *A*). For the most part, they include many areas of imperfectly drained Dixmont and poorly drained Burnham soils. Bangor, Burnham, and Dixmont soils are more limy than the Charlton, Sutton, and Whitman, which developed from acid materials.

The members of the Bangor series in the county are Bangor gravelly silt loam and its sloping, eroded sloping, and steep phases; Bangor silt loam and its moderately eroded, sloping, and steep phases; Bangor stony silt loam and its smooth and steep phases; and Bangor-Hartland stony complex.

Bangor gravelly silt loam (0–8% slopes) (BB).—This soil developed from compact till containing limy slate material. It is well drained internally and normally occurs on rather broad-topped deep till ridges. Areas occur near Unity and on Knox Ridge and generally occupy small irregular tracts along valley walls and benches or low-lying ridges of deep till between prominent hills or mountains on which there are shallow soils.

The soil is associated primarily with other members of the Bangor series but also occurs with the Charlton, Paxton, and Stetson. It is much like Charlton gravelly fine sandy loam but has definitely paler colors, a heavier texture, and limy materials in the subsoil. Though it is more like Bangor silt loam, it contains an appreciably greater quantity of gravel consisting of quartzite, schist, limy slate, and phyllite.

The following describes a profile in a cultivated area:

0 to 5 inches, grayish-brown mellow gravelly silt loam of fine granular to soft crumb structure; very strongly acid.
5 to 8 inches, strong yellowish-brown friable gravelly silt loam; very strongly acid.
8 to 18 inches, yellowish-brown gritty gravelly silt loam; strongly acid.
18 to 36 inches, pale-yellow compact but pervious gravelly silt loam; strongly acid.
36 to 48 inches, olive compact gritty till containing gravel and boulders; moderately acid.
48 inches +, olive slightly compact gritty till containing gravel, granitic boulders, and fragments of schist, slate, and phyllite; neutral to slightly alkaline.

The soil varies chiefly in the degree of gravelliness. Included in mapping are a few excessively stony areas of shallow soils or ledge outcrops and seep and marsh spots.

Approximately 70 percent of Bangor gravelly silt loam is under cultivation. The crops grown are about the same as those on Bangor silt loam. The rest of the land is about equally divided between pasture and woods or orchards. The gravel and stones in this soil interfere somewhat with seeding and cultivating, particularly when beans, peas, potatoes, and corn are grown. Because of gravelliness, crop stands are thin and irregular in some places, or weeds are prevalent, and crop yields are consequently somewhat lowered. There are fewer seep and marsh areas than in Bangor silt loam, however; and therefore this soil can be worked earlier in spring. The soil is not so subject to erosion, except in a few improperly tilled fields. The longer growing season and less erosion tend to offset the reduction in yield caused by the gravel.

Bangor gravelly silt loam, sloping phase (8–16% slopes) (BD).—This soil is similar to Bangor gravelly silt loam in essential profile characteristics but has stronger slopes. Except for its surface covering of gravel and small stones, it is also similar to Bangor silt loam, sloping phase. Small narrow bodies are associated with Charlton, Paxton, and Etna soils and occur primarily along valley walls in the central part of the county. Included with this phase are some slightly eroded areas. The gravel, however, retards runoff and erosion.

Bangor gravelly silt loam, sloping phase, is nearly all in pastures and orchards. Only about 10 percent occurs as parts of cultivated fields. The areas farmed produce the tilled crops common to the county, but yields are not so high as on Bangor gravelly silt loam, probably because of droughtiness. The gravel in this soil interferes to some extent with row-crop culture but has no unfavorable effect in production of pasture and orchard crops.

Bangor gravelly silt loam, eroded sloping phase (8–16% slopes) (BC).—This soil is similar to Bangor gravelly silt loam in the lower part but is thinner and more gravelly in the surface layers. Small scattered irregular areas occur in tilled fields on sloping ridges in the northwestern part of the county and are associated with other members of the Bangor series. Included with this phase in mapping are ledge outcrops and small areas of soils with impaired drainage.

All of this phase is cleared, and 80 percent is used for cultivated crops. The rest is in orchards or pasture. All the land has been subjected more or less to sheet and rill erosion. There are many light-colored elliptical patches where the surface soil has been removed, as well as frequent rill furrows down the face of slopes. As a result, crop yields may be somewhat less than those on Bangor silt loam, sloping phase.

Simple management—contour tillage, use of rotations that include hay and pasture crops much of the time, and some strip cropping—is necessary for control of erosion.

Bangor gravelly silt loam, steep phase (20–30% slopes) (BE).—In essential profile characteristics this soil is similar to Bangor gravelly silt loam, but its slopes are much steeper and it occurs primarily along hillsides and mountains. Along some drainage channels and hill crests this soil becomes more gravelly, and in a few places the ground is carpeted with slate, phyllite, and quartzite pebbles or fragments.

The phase is associated primarily with Charlton, Paxton, and Etna soils. It occurs chiefly in the central and northern parts of the county. Included are small areas of rock outcrop, of land excessively stony, or of soils with impaired drainage.

Most of Bangor gravelly silt loam, steep phase, is in reforested or brushy fields that were once cultivated but are now in pasture. Stone fences in the woods and pastures indicate stone removal at one time, and some of the more or less virgin wooded areas included with this phase are still somewhat stony. Only about 5 percent of this soil is cultivated. Erosion is active in only a few fields.

Bangor silt loam (0–8% slopes) (Bg).—This is the most important stone-cleared agricultural soil in the county. Broad regular areas are widely distributed in the central and western parts on the undulating to gently sloping tops of deep well-drained glacial till ridges. Good examples occur on Knox Ridge and near Unity (see pl. 3, *A*). The steeper parts of cultivated fields are subject to some erosion. The soil is associated largely with the well-drained Charlton and Paxton and the imperfectly and poorly drained Dixmont and Burnham soils.

Bangor silt loam is deep and well drained. It developed on deep compact but pervious silt loam till. The till is slightly acid to alkaline, but the soil profile is acid.

The following describes a profile in a cultivated field:

0 to 7 inches, pale-brown very friable silt loam with a weak crumb structure; contains some gravel and small fragments of schist or slate; very strongly acid.
7 to 10 inches, yellowish-brown friable silt loam containing some gravel and fragments of schist and slate; very strongly acid.
10 to 18 inches, pale yellowish-brown firm but friable silt loam containing some gravel and fragments of schist and phyllite; strongly acid.
18 to 42 inches, pale-yellow compact but pervious gravelly silt loam; strongly acid.
42 to 60 inches, olive slightly compact vesicular acid silt loam till; contains some gravel and rounded boulders and much fragmentary calcareous slate and phyllite material; slightly acid.
60 inches +, material similar in color, structure, and composition to layer above but neutral to alkaline.

Variations in the soil are chiefly textural. In places finely crushed rock makes the silt loam gritty. The texture, however, rarely becomes lighter than a loam or heavier than a silty clay loam. Included with this soil in mapping are areas of minor extent and importance—small ledge outcrops and bodies of soils, usually less than 3 acres in size—that have imperfect or poor drainage. Some gravel normally occurs on the surface of Bangor silt loam, but never as much as on the gravelly silt loam.

Approximately 80 percent of Bangor silt loam is cultivated. Because it occurs in large bodies with favorable topography, big fields can be established and heavy tillage and harvesting machinery can be used. Relatively high yields of potatoes, field beans, canning peas and corn, small fruits, and hay are now obtained. These yields can be improved by proper crop rotations and application of fertilizer and lime.

This soil is more susceptible to erosion than Charlton loam but less so than Paxton loam. None of the three is seriously affected by erosion, however, and all ordinarily require only plowing and tillage on

the contour to prevent noticeable erosion losses. In some areas careless tillage has caused some noticeably eroded spots on Bangor silt loam that may require additional conservation practices.

Bangor silt loam, moderately eroded phase (0–8% slopes) (BH).—This well-drained stone-cleared soil is similar to Bangor silt loam in most respects and is associated with practically the same soils. It occurs on the same kind of broad-topped undulating or gently sloping ridges, but has a very eroded surface layer. This layer may be half as thick as that of the silt loam, and in a few places rills have formed and exposed the subsoil. The general profile is essentially similar to that of Bangor silt loam.

At least 80 percent of this phase is used for potatoes, canning and field corn, peas, beans, and other tilled crops. The rest is in pastures or meadows. Yields for all crops except potatoes are almost as high as on Bangor silt loam. Potato yields may be 20 to 50 bushels an acre less. Control of erosion will usually require little other than use of long rotations or contour tillage.

Bangor silt loam, sloping phase (8–16% slopes) (BK).—Steeper slopes are the main difference between this soil and Bangor silt loam. In general topography, size, and shape, the areas of both are usually alike. This phase, however, is more often associated with the well-drained Charlton, Paxton, and Colrain soils than with the imperfectly or poorly drained Dixmont and Burnham.

The profile of this soil is similar to that given for Bangor silt loam, but in a few places on slopes where seepage is pronounced it is darker and more like Dixmont soil. Although generally stone free, this phase may have a few more stones and boulders than Bangor silt loam and, in addition, occasional ledge outcrops. Included with this phase are a few noticeably eroded spots in cultivated land.

Most of Bangor silt loam, sloping phase, is in permanent pastures, orchards, or meadows. Approximately 20 percent is cultivated to potatoes, beans, peas, corn, other vegetables, and small fruits such as strawberries. Where adequate applications of fertilizers and manure are made, yields are usually high. Cultivated fields usually have been subjected to some sheet erosion. Strip cropping, contour tillage, and use of relatively long rotations are necessary for erosion control.

Bangor silt loam, steep phase (20–30% slopes) (BL).—This well-drained stone-cleared soil is the steepest of those in the Bangor series that have been cleared. It is associated with about the same soils as Bangor silt loam, sloping phase. The areas are generally narrower and much smaller, however, than those of any other phase of Bangor silt loam, and they occur in the southern, western, or northern rather than in the central parts of the county.

The profile of this soil is similar to that described for Bangor silt loam, but the surface layer may be thinner, especially in parts of cultivated fields where erosion has been active. Although most of the soil is stone-cleared, some moderately stony areas of less than 2½ acres have been included in mapping. These are wooded or in pasture or orchards.

Approximately 10 percent of Bangor silt loam, steep phase, is cultivated; about 70 percent is in orchards or pastures. The rest is mostly

in brushy pastures where some blueberries are grown, or in young forest trees. The crops produced on the cultivated land are the same as on the Bangor silt loam, but yields are often less. The steeper areas are not suitable for cultivation.

Bangor stony silt loam (8–16% slopes) (BM).—This well-drained stony soil developed from a compact vesicular and pervious glacial till containing limy slate, phyllite, and schist fragments. Large and small areas are in the western and central parts of the county. The relief is generally smooth. The soil is associated primarily with well-drained stony members of the Charlton, Paxton, and Colrain series; but it also occurs in close association with imperfectly and poorly drained Dixmont and Burnham soils and, to limited extent, with Hermon soils and the Etna-Hartland complexes.

The profile is similar to that of other Bangor soils but there are more stones on the surface and throughout. The stones and boulders are generally thinly distributed and belong to two fairly uniform size groups—5 to 12 inches for the smaller, and about 24 inches for the larger. Boulders larger than this and glacial erratics seldom occur, though ledges may outcrop close to the base of slopes or at their crests.

As a considerable area of Bangor stony silt loam is in forest, the virgin profile is described:

0 to 3 inches, dark-brown mixture of organic matter and mineral soil; moderately acid.
3 to 5 inches, pale grayish-yellow silt loam, mellow and friable with little cohesion of particles; very strongly acid.
5 to 12 inches, brown to strong yellowish-brown mellow silt loam of fine granular to soft crumb structure; very strongly acid.
12 to 20 inches, yellowish-brown firm but friable silt loam; strongly acid.
20 to 40 inches, pale-yellow compact but pervious gritty silt loam till; strongly acid.
40 to 60 inches, olive compact but pervious till; acid to strongly acid.
60 inches +, olive moderately compact till; neutral to slightly alkaline.

The entire profile contains quartz gravel, rounded granite boulders, subangular slabs of schist, and many fragments of limy phyllite and slate. It varies somewhat in degree of stoniness and in color of the substratum. The color variations are caused by seepage. Included in mapping are small areas of gravelly and shallow soils that normally would be mapped as Stetson or Thorndike soils in cultivated or cleared areas. Some of these areas are extremely gravelly, especially along valley walls where crevasse fillings may be exposed or at the bases of certain morainelike deposits. There are also more marshy areas than on Bangor silt loam.

Nearly all of Bangor stony silt loam is wooded with mixed northern hardwoods, especially maple, and conifers. Spruce and fir are dominant, though many pure hardwood stands of ash, beech, birch, elm, hickory, and oak occur on ridges. This soil is well suited to timber production. Yields are high and lumbering operations are relatively easy by reason of the favorable topography. The stones on this soil would have to be removed before it could be cultivated.

Bangor stony silt loam, smooth phase (0–8% slopes) (BN).—Seepage areas may be more prevalent than in Bangor stony silt loam. The soil is more often associated with imperfectly drained members of

the Dixmont series. Usually, however, areas of this phase are associated with the same soils and occur in the same locations as those of Bangor stony silt loam, though they are smaller and more scattered.

In essential profile characteristics other than thickness of surface soil and the occurrence of 5 to 7 inches of mucky material on the surface in some places, this soil is much like Bangor stony silt loam. Stoniness, a prominent characteristic of the soil, is moderate as compared with other stony silt loams.

Included with this phase in mapping are areas of ledge outcrop and of large boulders, marshy spots, places having excessively impeded drainage, and gravelly tracts. Also included are some areas on the tops of very high ridges that contain a few ledge outcrops and are underlain by compact till. These last-named areas approach shallow and normal phases of Paxton soils in profile characteristics, but most of them contain the limy slate, quartzite, or phyllite slabs and fragments typical of Bangor soils.

Most of Bangor stony silt loam, smooth phase, is wooded. A few cleared areas are used as pastures or blueberry fields.

Bangor stony silt loam, steep phase (20–30% slopes) (Bo).—In important profile characteristics this soil is similar to Bangor stony silt loam, but it differs in some respects. In most places the surface soil and subsoil layers are much thinner. Also, the profile is more variable from place to place and may include pockets of leached material 2 to 5 inches thick. Stones and boulders are somewhat more numerous on the surface, and there are a few large erratics 4 to 6 feet in diameter.

This soil occurs in the central and western parts of the county in rather long irregular narrow bands on the steepest parts of the ridges of till materials. It is associated with other stony soils of the Bangor series, and with the Paxton, Charlton, and Colrain. This phase is rougher than others of Bangor stony silt loam.

Dissection is not great enough to interfere seriously with lumbering, but the steeper slopes may make the work more difficult than on other phases of Bangor stony silt loam. Ledge outcrops, seepage areas, and gravel spots are common.

Bangor-Hartland stony complex (8–16% slopes) (Bf).—This complex occurs on gently rolling to hilly areas transitional between Hartland or Suffield soils and stony till or mountain lands. In large clay flats the complex may also occupy islandlike areas of very stony till.

The Bangor-Hartland stony complex is composed largely of very stony areas of less than 3 acres in which stony Charlton, Paxton, Hermon, or Bangor soils are in mixed association with those of the Hartland and Suffield series. The stones are 10 to 24 inches in diameter and may be of granitic, gneissic, schistic, or phyllitic material, both acid and limy. Very large erratics of gneiss or granite also occur from place to place, and occasionally rather bouldery and cobbly knolls of till rest on clay soil.

Most of the complex is wooded with a fair growth of white pine, hemlock, spruce, fir, maple, ash, oak, and aspen. Harvesting timber may be difficult in places because of the broken terrain, stones, and stickiness of the clay when wet.

BIDDEFORD SERIES [5]

The soil of the Biddeford series is generally on poorly drained and sometimes saturated nearly level areas of lacustrine and marine sediments. Slopes are less than 3 percent. The soil occurs primarily in association with other soils developed from clay—the well-drained Hartland and Suffield and imperfectly drained Buxton. It also occurs to a limited extent with Bangor, Charlton, and Paxton soils on till, and with the Stetson and Etna around lake and river flats. It is characterized by a rather dark-gray profile mottled with gray and yellow and is generally in pasture or forest.

Most of the Biddeford soil occurs around lakes on silty lacustrine deposits, and for this reason only one type, Biddeford silt loam, is mapped. A few areas developed on marine clay sediments are more nearly a silty clay or silty clay loam in texture but were mapped with Biddeford silt loam.

Biddeford silt loam (0–3% slopes) (Bp).—This soil occurs largely on flat lacustrine (lake) sediments, though sometimes on marine, silt, and clay sediments. Fairly large and regular rounded or elliptical bodies occur in all parts of the county around the lakes and waterways. The soil is poorly drained to saturated.

The following describes a profile in a pasture and is representative of about half the areas mapped:

0 to 5 inches, dark grayish-brown to very dark-gray silt loam to silty clay loam; fine granular structure; moderately acid.
5 to 8 inches, mottled gray and yellowish-gray silt loam to silty clay loam; structureless; moderately acid.
8 to 15 inches, mottled grayish-yellow and gray or dark-gray silty clay or clay; sometimes plastic; moderately acid.
15 to 32 inches, strongly mottled gray and dark-gray clay; material very compact, and hard or plastic depending upon moisture conditions; moderately acid.
32 inches +, mottled dark-gray and gray plastic clay; moderately to slightly acid.

Variations from the profile just described are usually in texture and degree of saturation. Included because of their limited extent are some areas with a silty clay or silty clay loam texture. Other areas included are more saturated than is normal for the soil and may have a few inches of muck on the surface. Stones and rock ledges usually do not occur in Biddeford silt loam, but, as in the Buxton soils, there may be a few boulders.

About half the Biddeford silt loam is forested; the other half is pastured. The forest stand now includes alder, aspen, spruce, larch, hemlock, and other water-tolerant plants. Some pulpwood and cordwood and wattles for fish weirs can be cut from these stands. The pastured areas usually support fairly good stands of grasses, including redtop, alsike clover, and the meadow fescues. Most pastures can be grazed from May to October at the rate of a little more than one cow an acre. On the brushy pastures, 1½ to 2½ acres may be required for

[5] The Biddeford series as mapped in Waldo County included a rather broad soil drainage range. In recent years this series has been separated into the poorly drained Scantic and the very poorly drained Biddeford because of differences of profile and corresponding differences in use and soil management requirements.

each cow. As a rule, no fertilizer or lime is applied to pastures, though top dressings of these materials would be helpful.

BURNHAM SERIES [6]

Soils of the Burnham series occupy moderately stony areas of poorly drained limy phyllitic and slaty glacial till. They occupy level to sloping areas on broad-topped glacial ridges, mountain flanks, and valley floors. They are saturated much like the Whitman soils and are similar in plant growth and stoniness; they differ in having more uniform textures, more consistent profiles, and less acidity. Usually they are without the mucky surface of Whitman soils and are also somewhat lighter in color and heavier in subsoil texture. The Burnham subsoil rarely becomes coarser than a loam. Two types of Burnham soil are mapped—Burnham silt loam, occurring in areas cleared of stone, and Burnham stony silt loam in those not cleared. All very stony areas of poorly drained soil are included with soils of the Whitman series in mapping.

Burnham silt loam (0–3% slopes) (Br).—This stone-cleared poorly drained soil occurs in slight depressions and lowlands between the broad-topped glacial till ridges of the northern and central parts of the county. It is associated principally with the Bangor and Dixmont soils but occasionally occurs with the Thorndike and other soils developed from limy materials. It is not an extensive soil and appears mainly as rounded or elliptical areas in cultivated land or in pastures.

The profile described in the following indicates the degree to which Burnham silt loam is saturated:

0 to 5 inches, very dark grayish-brown mellow silt loam with fine granular to soft crumb structure; medium acid.
5 to 18 inches, mottled gray, yellow, and sometimes brown slightly compact heavy silt loam to silty clay loam; medium acid.
18 inches +, gray saturated gravelly silt loam till; contains many small platy fragments of dark calcareous phyllite; neutral to mildly alkaline.

Variations in the profile occur principally in degree of saturation and consequent intensity of mottling and in the presence or absence of a thin layer of surface muck. Occasional ledge outcrops are included in mapping, though usually there are no surface stones or erratics.

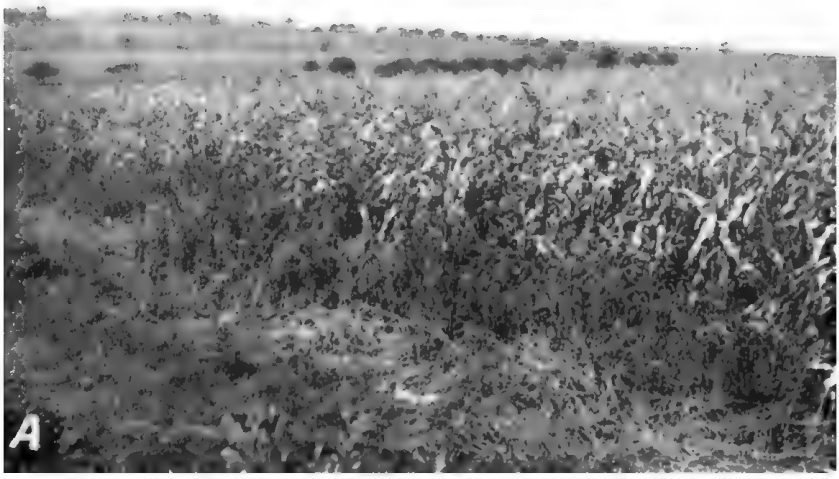
Approximately 10 percent of Burnham silt loam is in cultivated fields and needs artificial drainage for successful crop production. The rest is in cleared or improved pastures or hay land. The grazing capacity is one cow an acre for a period of about 160 days. The land can be used a shorter or longer time by increasing or decreasing the number of stock grazed.

Burnham stony silt loam (0–5% slopes) (Bs).—This stony poorly drained soil occurs in slight depressions and lowlands between deep glacial till ridges in the central and northern parts of the county. Slopes are generally between 0 and 5 percent but may range to 8 percent along mountainsides where there are seepage springs. The soil is associated mainly with the Bangor and Dixmont on till but may

[6] The Burnham series as mapped in Waldo County included a rather broad soil drainage range. In recent years the series has been separated into the poorly drained Monarda and the very poorly drained Burnham because of differences of profile and corresponding differences in use and soil management requirements.

A, View of Acton loam, showing vegetation and normal relief.
B, Acton stony loam in foreground; Hermon fine sandy loam around house; Rough stony land (Canaan soil material) in background.

A, Profile of Adams loamy fine sand, showing leaching or podzolization.
B, Crops on Adams fine sandy loam.



A, Bangor silt loam ridge with characteristic relief.
B, Grass-covered Buxton silt loam with characteristic relief.

A, Charlton loam, showing rounded bouldery schistose and gneissic till.
B, View of Charlton loam, showing normal relief and some crops. Small area of Sutton loam at base of hill.

occur adjacent to Stetson and Etna soils on outwash. Though somewhat like the Whitman, it usually contains smaller and more nearly flat subangular stones of limy schist and phyllite or quartzite and, in addition, some rounded ones of gneiss or granite.

In texture the soil is more or less uniformly a silt loam in the surface layers and grades to silty clay loam or clay loam in the lower layers, all of which are mottled yellow, gray, and brown. Some ground-water leaching has occurred. A few profiles show as evidence of leaching a very thin ashy-gray layer and a brown-tinged one about an inch thick. In most places, however, the water table is constantly 12 to 20 inches from the surface.

Nearly all the land is timbered and supports good stands of alder, aspen, cedar (arborvitae), larch, and spruce. Much of the growth is cut for pulpwood and cordwood, and a limited quantity for saw timber. The soil is also a favored source of wattles used in construction of fish weirs.

The following describes a representative profile in a forested area:

0 to 3 inches, very dark-brown stony silt loam of coarse crumb structure; moderately acid.
3 to 5 inches, brownish-gray firm but friable silt loam; acid.
5 to 12 inches, pale yellowish-brown firm but friable silt loam; medium acid.
12 to 18 inches, slightly mottled gray, yellow, and brown silt loam; medium acid.
18 inches +, gray or mottled gray, yellow, or rusty-brown compact fairly dense silt loam to silty clay loam; contains much platy dark phyllite; slightly acid to neutral, often alkaline below 3 feet.

The entire profile contains some boulders and gravel of granitic material. Some areas are more mucky than is indicated in the foregoing description, but the muck is rarely thicker than 3 inches. Other tracts include limy ledge outcrops and bodies of shallow soil.

BUXTON SERIES

The soil of the Buxton series occurs on imperfectly drained marine and lacustrine (lake-laid) sediments throughout the county and occupies level to gently undulating areas. It is generally free of stone, though some transitional areas adjacent to soils on stony till may have a few erratics. Ledges may also occur in areas of Buxton soil.

Buxton soil is associated with others developed from silt and clay—the Hartland, Suffield, and Biddeford; to a lesser extent with those from imperfectly and well-drained till—the Dixmont and similar soils; and with the Bangor or Charlton and similar soils. Buxton soil is similar to the Hartland, Suffield, and Biddeford in having parent material of silt and clay but differs from the first two in being less well drained and from the Biddeford in being better drained. It differs from all soils but these in parent material. Buxton soil is usually yellowish-gray and gray in the surface layer; it has firm to hard or plastic mottled gray and yellow silts and clays in the subsoil and substratum. The Buxton series is represented by only one type—Buxton silt loam.

Buxton silt loam (0–3% slopes) (Bu).—This imperfectly drained soil occurs on nearly level to gently undulating silt and clay deposits around lakes and streams (pl. 3, *B*). The areas are usually rather large and rounded or elliptical. The soil is usually associated with

those of the Hartland series along Penobscot Bay and River, and elsewhere in the county, with the Biddeford and Suffield. Generally it is imperfectly drained.

The following describes a profile in a pasture:

0 to 7 inches, dark-brown to dark grayish-brown silt loam of fine granular to soft crumb structure; moderately acid.
7 to 16 inches, yellowish-gray silt loam to silty clay loam slightly mottled with gray; structureless and moderately acid.
16 to 26 inches, mottled grayish-yellow and gray silty clay, in places plastic or hard depending upon moisture condition; moderately acid.
26 inches +, dark-gray clay; compact, and plastic or hard depending upon moisture conditions, moderately acid.

The profile just described is free of stone, sand, or gravel and represents most areas of the soil. Some variations do occur. In areas developed from marine clays the surface layer may be clay loam or silty clay, and in those from lacustrine deposits, the substratum may be predominantly silty.

Buxton silt loam is normally in good pasture or hay and is rarely cultivated.

Buxton-Biddeford stony silty clay loams (0–5% slopes) (Bt).—This complex consists of areas of Biddeford and Buxton soils so stony that they cannot be improved for use as pasture. It occurs mainly in areas transitional between bodies of imperfectly and poorly drained lacustrine and marine sediments and tracts of stony glacial till or mountain land. Scattered erratics and piles of large and medium-sized stones dot the nearly level to undulating clay. The boulders, frequently angular, may occur piled end on end or as rounded single erratics of granite, coarse gneiss, and hard-rock schist. The nearly level general relief is marked with a succession of knolls and higher land around the stones. Except for surface texture the soil in low parts of the microrelief is more nearly like Biddeford silt loam, and that on higher ground more closely resembles Buxton silt loam, both of which are elsewhere described.

Most of the complex is wooded with somewhat thin stands of larch, fir, hemlock, alder, aspen, and some white birch; a few areas are in poor pasture.

CANAAN SERIES

Soils of the Canaan series have developed on granitic ledge land and occur on glaciated mountains, ridges, and hillsides where extremely little till remains. The till left between the ledge exposures is well drained and rarely more than 20 to 30 inches deep. The soils are at rather high elevations, 700 feet or more; are strongly leached, or podzolized; and have rather coarse-textured profiles bebecause of their granitic parent material. They are extensive around Mount Waldo in the northeastern part of the county and are usually closely associated with the deep Hermon soils in the same locality. Along Penobscot Bay and around Swan Lake, they occur on granite promontories and stream-dissected ledge land. General relief ranges from undulating to mountainous.

Canaan soils are associated with the imperfectly and poorly drained Acton and Whitman on deep till; with the Shapleigh and Hinsdale on shallow till, or ledge land; and with the well-drained deep Hermon soils. The Canaan soils are similar to Shapleigh and Hinsdale in having developed on shallow till and in showing ledge exposures,

but differ in kind of parent rock. The Canaan soils developed from granite; whereas the Shapleigh are from pegmatite and the Hinsdale are from black granite, or syenite. All are well drained, but Canaan soils are generally more completely leached and coarser than the Shapleigh. The Hinsdale are grittier than the Canaan because of many small cubical weathered fragments of syenite in their profiles. Canaan soils are much like those of the Hermon series but are shallower. The till underlying Hermon soil is rarely less than 40 inches deep, as compared with the maximum of about 36 inches for the Canaan. Though they do include marshy spots of less than 3 acres, Canaan soils have better drainage and are underlain by shallower till than the Acton and Whitman.

The series consists of Canaan loam and its sloping and steep phases, Canaan stony loam, and Canaan very stony loam and its hilly phase. Rough stony land also includes Canaan soil material—primarily granitic ledge exposures of some height.

Canaan loam (0–8% slopes) (Ca).—This soil is usually on undulating tops of hills or on gently sloping to undulating benches along high mountainsides of shallow granitic till, and occasionally on undulating granite ledge land in valleys. It is associated with Hermon, Acton, and Whitman soils and occurs mainly in the northeastern part of the county. Some rounded ledge outcrops, a few stones mostly of granite and gneiss, and scattered erratics 4 to 5 feet in diameter occur but do not seriously interfere with tillage. About 70 percent of the soil is at least 10 to 15 inches deep to underlying rock. In development over rock this soil is like Shapleigh loam, except the Shapleigh has deeper material (12 to 20 inches). Canaan loam is well drained internally and externally but may include a few marshy spots.

The subsoil sometimes rests on a hard granite ledge. In other instances it is on a dull-gray or grayish-yellow stony sandy loam of glacial till that extends the profile to a depth of 25 to 30 inches before hard granite ledge is encountered. Approximately 40 percent of the soil is on this deeper material. The rest is shallower, though in few areas are the generally smooth and rounded rock ledges exposed more than a foot or two.

The following describes a profile in a cleared area:

0 to 3 inches, dark-brown loam; mellow and very strongly acid.
3 to 7 inches, strong yellowish-brown slightly firm loam; strongly acid.
7 to 16 inches, yellowish-brown slightly firm but friable loam; strongly acid.
16 to 24 inches, pale yellowish-brown to grayish-yellow gritty loam to sandy loam; contains some gravel and granitic boulders; strongly acid.
24 to 30 inches, gray gritty sandy till; has little cohesion and is acid.
30 inches +, hard, smooth granite bedrock; acid.

All of Canaan loam is cleared. It may be cultivated, in hay, in pasture, or idle. Fields tend to be small and irregular because exceptionally thin soil must be avoided in cultivating. Farms on this soil tend to produce mainly for household use; vegetables, small fruits, poultry, goats, or other crop and animal specialties are the source of cash income. The success of this type of farming depends on a readily available market—one along a well-travelled road or near a village or city; therefore, about 25 percent of this soil is cultivated. The rest, in all other parts of the county, is idle or in pasture or hay.

Yields are moderately high on this soil where it is associated with better ones on well-managed farms, because fertilizer, lime, and manure are used. They are low on farms where nearly all the land is on shallow Canaan loam. Yields of small fruits and vegetables are rather high where intensive cultivation is practiced. Most pastures are not improved, and the hayfields are usually poorly managed.

For profitable yields, good management that includes liming and fertilization is needed. The addition of liberal quantities of stable and green manure are essential in maintaining the organic-matter content. As this soil is on slopes of less than 8 percent and is fairly coarse-textured, no erosion control other than use of contour cropping and fairly long rotations is needed.

Canaan loam, sloping phase (8–15% slopes) (CB).—Though similar to Canaan loam in many respects, this soil is on more sloping and rolling glacially smoothed granite-ledge ridges, mountainsides, and valley exposures. It occurs in association with Hermon and Shapleigh soils in the northeastern part of the county. The areas are small and irregular. Poorly drained spots are extremely few. To a limited extent there are ledge outcrops, stones, or boulders of granite and gneiss; but the land is tillable and at least 10 inches deep to underlying bedrock over 70 percent of its area. The soil profile is much like that described for the Canaan loam, though its total depth, even in deeper areas, rarely exceeds 20 inches. In contrast, Canaan loam may be as much as 30 inches deep.

Canaan loam, sloping phase, is in orchards, pasture, or hay or is abandoned. Fields tend to be larger than those on Canaan loam, but the cultivated areas are just as irregular and small. Approximately 15 percent of the soil is cultivated. In areas under improved management, crop yields are about the same as on the Canaan loam. Yields for the soil as a whole are lower. This soil is best and most economically used for pasture, hay, or timber.

Canaan loam, steep phase (20–30% slopes) (CC).—Except for steeper and more rolling slopes, this soil is much like the sloping phase. It is limited to rather high mountainsides and other high elevations in the northeastern part of the county. Ledge outcrops and stones are more pronounced than on the sloping phase. The areas are generally long, narrow, and irregular, however, and difficult to till. Although ledges do not occupy more than 30 percent of the fields, the soil between them is usually only 10 inches deep.

In profile this phase is similar to Canaan loam, though it does not have much gray or grayish-yellow till below the black 0- to 4-inch surface soil and 4- to 10-inch subsoil. The subsoil rests directly on smooth hard granite ledge over at least 60 percent of the total area.

Most of this land has been cleared at one time. Some of it is still in pasture, orchards, or hay. The greater part is now in abandoned brushy pasture covered with dwarf juniper, aspen, birch, and maple, or in young timber—oak, birch, beech, maple, and some hemlock or pine, depending on locality.

Canaan stony loam (0–16% slopes) (CD).—This soil occurs largely on the rolling tops and high sloping sides of glacially smoothed granite ridges and mountainsides. Also, it occurs in some valleys where there are a considerable number of granite ledges and a very thin mantle of

stony till. The ledges are usually smooth and rounded, less than 8 or 10 feet high, and seldom exposed on more than 30 percent of the soil area. The stones or boulders of granite and gneiss are thinly scattered and are less than 5 feet in diameter, averaging about 15 inches. Both ledges and stones, however, are abundant enough to make cultivation impossible.

This soil is mostly wooded, though some is in blueberries and brushy pastures. The forest stand consists of red and white oaks, birch, beech, maple, white pine, and some hemlock or jack pine. Timber yields are moderately high. Although the soil is thin and stony, it has a more or less smooth relief and trees can be readily harvested.

The following describes a profile in a wooded area:

0 to 2 inches, black mixture of forest debris and loam soil, somewhat compact and held together by tree roots; very strongly acid.
2 to 4 inches, dark-brown firm but friable stony loam; very strongly acid.
4 to 7 inches, light-gray very friable loam stained dark brown along tree roots that traverse the layer; very strongly acid.
7 to 9 inches, reddish-brown firm but friable slightly indurated loam; strongly acid.
9 to 20 inches, yellowish-brown loose sandy loam stained brown or dark brown along root channels; strongly acid.

Hard granite ledge underlies the profile. Profiles such as this from wooded areas show clearly that the soil is well-leached, or a podzol. The third layer from the top, 2 to 3 inches thick, is definitely leached. Imperfectly and poorly drained spots, bodies with textures other than a loam, and a few deep and very shallow areas are included but do not affect the general characteristics of this soil.

Canaan very stony loam (8–16% slopes) (CE).—Most of this soil is on rolling and sloping glaciated high granitic ridges and mountains and somewhat dissected ledgy areas along streams. The soil is associated with the Hermon on deep and the Shapleigh on shallow well-drained till, and with the Acton on imperfectly and the Whitman on poorly drained till. It also occurs frequently with the shallow phase of Sutton stony loam. Minor geological dissection occurs because of this relief. Where dissection occurs—especially along hill crests and stream channels—the exposed granite ledges are usually smooth and rounded. Generally, the soil is well drained. A few imperfectly drained areas, as well as some having coarse and sandy loam textures, are included in mapping.

Profiles of this soil are difficult to examine because there are frequent exposures of granite ledge and a great many stones and boulders 15 to 30 inches in diameter. These are in scattered piles and somewhat evenly distributed over the ground between the piles. A few boulders 4 to 5 feet in diameter may also occur. The soil material of Canaan very stony loam is thin, possibly not more than 10 inches deep anywhere. It is much like Canaan stony loam.

Canaan very stony loam is obviously unfit for agriculture. Timber grows over most of it, but the inaccessibility of the stand and general stoniness of the soil make harvesting difficult in places. Reforesting cut-over areas is also difficult because trees grow and reseed slowly on most of the ledge land, and further, this as well as other Canaan soils are generally at high elevations. Because of faulty lumbering, many areas of this soil now support no growth except dwarf juniper, aspen, maple, and birch. Planting of seedlings and protection against fire are necessary to bring back the hardwood-pine-spruce stands.

Canaan very stony loam, hilly phase (20–30% slopes) (CF).—Usually this soil occurs on somewhat dissected hilly or very steep high granitic mountainsides and valley areas. In most respects it is similar to Canaan very stony loam, though it has a few more stones, large boulders, and granite ledges. Its steeper slopes and greater dissection, rather than an increase in rockiness, are the chief differences. Most of the granite ledges are upright and rounded; usually they are not exposed over more than 65 percent of the soil areas and are less than 15 feet high. The 20- to 30-inch stones or boulders of granite and gneiss are scattered rather evenly over the ground. A few boulders 4 to 6 feet or more in diameter occur. The soil is associated mainly with Hermon soils and the shallow phase of Sutton stony loam.

Timber yields are similar to those on Canaan very stony loam. The trees are a little more difficult to harvest, and reforestation is slow on cut-over areas. Red and white oaks, beech, hickory, ash, jack pine, and spruce grow well on all except the cut-over areas that have been burned. A brushy growth of birch, aspen, soft maple, and dwarf juniper covers the burned tracts. Faulty lumbering is largely responsible for the lack of seed trees and the absence of a young forest stand that would prevent undesirable brushy species from gaining a foothold and keep the woods from drying out during summer.

CHARLTON SERIES

Soils of the Charlton series are developed from deep well-drained moderately compact to compact but pervious schistose till. Phyllite, fine gneiss, micaceous banded gneiss, and a little granite are included in the generally olive-colored till. In this till stones and boulders (pl. 4, *A*), are prominent but smaller and not so abundant as in the granitic Hermon soils. The till also includes finer material—flat-sided gravel and fragments of schist and phyllite—which makes some of the Charlton soils exceptionally gravelly.

Charlton soils are level to fairly steep and are associated primarily with other well-drained deep till soils—the Bangor, Paxton, and Colrain, and to a lesser extent with the shallow Hollis, the Westford, and the imperfectly drained Sutton soils. Charlton soils differ from the Bangor and Colrain because they lack limy material, and from the Paxton in degree of compaction and perviousness of the till. Charlton soils are readily permeable; the Paxton are not. Soils of the Charlton series have parent material several feet deeper than that of either Hollis or Westford soils, and they are much better drained than Sutton soils. A few areas of Charlton soils, indicated in cleared or cultivated land by map symbols, include both ledge outcrop and imperfectly drained spots of less than 3 acres.

The Charlton series includes 10 soils in Waldo County, and 7 are cultivated to varying degrees. Charlton loam and its sloping, eroded sloping, steep, and eroded steep phases are the most important. Charlton gravelly fine sandy loam and its rolling phase and Charlton stony loam, with its undulating and steep phases, complete the list.

Charlton gravelly fine sandy loam (3–8% slopes) (CG).—This soil is a mellow, well to somewhat excessively drained, moderately acid, brown gravelly fine sandy loam. It is usually developed on deep morainic deposits along valley walls and floors and on the crests or

sides of till ridges. The topography is ordinarily undulating to gently rolling, though nearly level areas occasionally occur on flat-topped benches along valley walls or floors near the confluence of glacial streams. Irregular bodies of the soil are distributed in the central and western parts of the county, where they are associated with soils of the Stetson and Etna series.

The till underlying this soil consists of gneiss, pyritiferous schist, and some granitic materials. The gravel is relatively uniform in shape and size—flattened and 1 to 3 inches in diameter. Some areas of the soil include rounded gravel and sand and are similar in certain respects to the Etna and Stetson soils, which, however, have developed on terraces from outwash materials instead of till. The Charlton till seems to have been modified by water action in such areas, but it is primarily ice-laid material.

Following is a profile in a cultivated field:

0 to 6 inches, brown mellow gravelly fine sandy loam; soft crumb structure.
6 to 12 inches, strong yellowish-brown slightly firm gravelly fine sandy loam.
12 to 20 inches, yellowish-brown firm gravelly fine sandy loam.
20 to 46 inches, pale yellowish-brown to yellowish-gray fairly compact till.
46 inches +, olive platy-structured slightly compact schistose and gneissic till containing rounded boulders of gneiss and schist.

The entire soil is moderately acid, though the least acid of those in the Charlton series. Included in mapping are a very few small areas having imperfect or poor drainage, occasional ledge outcrops of micaceous gneiss or schist, and some eroded spots—all of which are indicated by symbols where they occur in cultivated areas.

Approximately 70 percent of Charlton gravelly fine sandy loam is cultivated, even though it is gravelly and somewhat droughty. The gravel interferes with planting and tilling to some degree. Yields are generally less than on Charlton loam in all areas except those where some clay or silt has been mixed with the gravelly till. Moisture relations are better where the clay and silt are included. The crops common to the county are grown. Beans, peas, corn, hay, and small fruits are more important than potatoes. Applications of manure, ground limestone, and complete fertilizer are necessary to maintain good yields.

Charlton gravelly fine sandy loam, rolling phase (8–15% slopes) (CH).—This soil is similar to the Charlton gravelly fine sandy loam in profile characteristics but has steeper slopes and is generally somewhat sandier. Consequently, it is a little more droughty. The small irregular bodies are distributed in the central and western parts of the county, where they are associated with Bangor, Colrain, Paxton, Sutton, and Etna soils. The topography is somewhat like that of the Etna soils.

Included with this phase in mapping are areas of rock outcrop, soils with impaired drainage in small depressions, and eroded spots. The eroded places are not numerous and usually occur in cultivated areas having heavier than normal textures. Because of droughtiness, only about 20 percent of Charlton gravelly fine sandy loam, rolling phase, is cultivated; most of the land is used for permanent pasture or pulpwood production. As the soil is permeable and is used mainly for pasture and forest, erosion is not serious. Yields are less than for Charlton gravelly fine sandy loam.

Charlton loam (3–8% slopes) (CK).—This soil is mellow, well-drained, slightly to moderately acid, and rather uniform in texture. It developed on deep well-drained till composed of gritty metamorphosed and granitic rock materials and occupies relatively smooth topography on the tops of long broad ridges and sloping hillsides (pl. 4, *B*). Moderate quantities of flat, angular schistose gravel are scattered over its surface and in the profile. Irregular large and small bodies of this soil are associated with soils of the Paxton-Sutton-Whitman catena and are distributed throughout the county, principally in the central and southeastern parts.

The following describes a profile in a cultivated area:

0 to 8 inches, brown mellow loam having a soft crumb structure.
8 to 18 inches, strong yellowish-brown firm but friable loam.
18 to 40 inches, pale yellowish-brown slightly compact gravelly loam.
40 inches +, olive gritty platy-structured till; contains boulders of gneiss and schist and is 30 to 40 feet thick in places.

The profile just described is medium acid throughout. It is representative of most newly cleared areas now under cultivation. In older cultivated areas the surface layer is thinner and paler. Included with this soil in mapping are some prominent ledges and small bodies of soils with impaired drainage.

Approximately 90 percent of Charlton loam is used for farming. Some rill erosion is noticeable where rows and cultivation are up and down slopes. There is little accelerated erosion in other tilled areas. Potatoes, beans, peas, and other truck crops, corn, oats, and timothy-and-clover hay produce well on this soil under ordinary management. The soil is relatively fertile, but applications of lime and fertilizer are required for best yields of most crops.

Charlton loam, sloping phase (8–15% slopes) (CN).—This soil is similar to the Charlton loam phase but its stronger slopes promote more rapid runoff and erosion. Also, the surface soil may be somewhat thinner and the crop yields somewhat lower. Large irregular bodies of this soil are distributed throughout the county, particularly in the southern part, and are associated with Bangor, Colrain, and Sutton soils. Noticeable erosion is not general on this soil, though a few isolated patches of the eroded sloping phase of Charlton loam are included in the mapping, as well as small areas of ledge outcrop and of soils with impaired drainage.

Approximately 70 percent of Charlton loam, sloping phase, is in sodded orchards, meadows, and pastures; the rest is cultivated to small fruits and truck crops. Management requirements are similar to those suggested for the same crops on Charlton loam, but for best results, attention must be given to the control of water, especially on the steeper slopes.

Charlton loam, eroded sloping phase (8–16% slopes) (CL).—Except for its steeper slopes, this soil is similar to the Charlton loam. In general, it cannot be considered severely eroded, but in many rounded and elliptical spots the surface soil has been removed and the light-colored subsoil is exposed. In a few instances the underlying parent material shows in shallow gullies. Erosion is limited by the structure and consistence of this soil, which permit free internal drainage and thereby reduce runoff. Further, most of the areas with slopes in the upper part of the range (where severe erosion might occur) are

not used continuously for cultivated crops. Ledges, small stony areas, and spots of other soils with impaired drainage are included with this phase in mapping.

About 90 percent of Charlton loam, eroded sloping phase, is tilled. Good crops of potatoes, corn, beans, peas, other truck vegetables, and small fruits are obtained with good management. Yields are not so high as on Charlton gravelly fine sandy loam, however, because the soil is subject to greater erosion and consequent increased loss of organic matter, plant nutrients, and moisture. Heavy applications of manure and fertilizer and some lime, together with the use of longer rotations that include a large percentage of hay crops, are necessary.

Charlton loam, steep phase (20–30% slopes) (Co).—In profile characteristics and most other respects except slope, this soil is similar to Charlton loam. The soil is associated with the well-drained Bangor, Colrain, and Paxton and the imperfectly drained Sutton soils. It occupies fairly large irregular areas, mainly along the sides of till ridges, in the southern and central parts of the county. It contains stones and boulders, and considerable gravel consisting of somewhat rounded flat fragments of schist and phyllite, and rounded pebbles of pegmatite, quartz, and coarse gneiss. The range in size is from ⅛ to 3 inches for the pebbles and from 3 to 15 inches for the stones and boulders.

Included with this phase in mapping are small areas of gravelly and stony soils, of ledge outcrops, and of soils with impaired drainage that occur frequently in spots or pockets on the sloping hillsides. All of these inclusions interfere with cultivation to varying degrees.

A few fields, about 20 percent of the total area, on the less steep parts of this phase are in cultivated crops. Most of the soil, though formerly cultivated, is now in woods, pastures, sodded orchards, or blueberry plantings. The soil is well suited to orchard fruits because it is well-drained and its slopes favor good air drainage. On the areas still cultivated, complex practices are necessary to control erosion.

Charlton loam, eroded steep phase (20–30% slopes) (Cm).—This soil is similar to the Charlton loam, but the surface layer is more severely truncated by active erosion. It occurs in irregular small bodies in association with Bangor, Colrain, Paxton, and Sutton soils. Areas of it are distributed throughout the county, principally in the central part. Small areas of ledge outcrop, of gravelly soils, and of soils with impaired drainage are included with this phase, and all of these interfere with cultivation in varying degrees.

All the soil is cleared and cultivated. The principal crops are potatoes, peas, beans, corn, and truck crops. Yields of these crops are somewhat lower and fertilizer requirements are higher than on cultivated areas of the steep phase of Charlton loam. Rather complex conservation practices are required for this eroded steep phase if its use for production of cultivated crops is to be continued. Diversion terraces, contour strip cropping, long rotations, and similar practices are necessary to control erosion.

Charlton stony loam (8–16% slopes) (Cp).—This is a mellow well-drained strongly acid brown soil. It is developed on deep well-drained till similar to that underlying all the Charlton soils and oc-

cupies the more rolling parts of wide-topped ridges. Stones 8 to 12 inches and boulders 25 to 30 inches in diameter are uniformly scattered over the surface and throughout the profile. Fairly large regular bodies of this soil are distributed in the south-central and eastern parts of the county. They are associated with members of the Bangor, Colrain, Paxton, and Sutton series.

The following describes a profile in a forested area:

0 to 3 inches, dark-brown organic matter and mineral soil material; strongly acid.
3 to 6 inches, brown mellow loam; strongly acid.
6 to 12 inches, strongly yellowish-brown firm but friable loam; strongly acid.
12 to 28 inches, yellowish-brown loam, firm but friable; acid.
28 to 42 inches, yellowish-gray slightly compact sandy loam; strongly acid.
42 inches +, olive compact platy-structured gritty till containing rounded boulders of gneiss and granite; medium acid.

Variations from the profile just described are chiefly in surface texture, which ranges from loam to sandy loam. A few ledge outcrops, marshy spots, and small bodies of soils with impaired drainage were included in mapping.

Approximately 20 percent of Charlton stony loam is cleared and used for permanent pastures and orchards. Most of the rest is forested with good stands of northern hardwoods and some spruce, hemlock, and pine of saw-timber and pulpwood sizes. The general size and condition of the trees indicate that the fertility of the soil is good.

Charlton stony loam, undulating phase (0–8% slopes) (Cs).—The surface layers may be somewhat thicker, but otherwise this soil is similar to Charlton stony loam in profile characteristics. It occupies the smoother parts of glacial drift ridges. The stones are small and thinly scattered; boulders rarely exceed 24 inches in diameter. The small regular bodies of this soil are associated with the Colrain, Bangor, Hollis, and Sutton and are distributed in the eastern and southern parts of the county.

This soil varies somewhat in degree of stoniness, color, and texture. One or two areas transitional to soils of the Whitman and Sutton series have a 6-inch surface covering of mucky material. Rock ledges, small bodies of soils with impaired drainage, and areas of excessive stoniness were included in the mapping.

Most of Charlton stony loam, undulating phase, supports trees of pulpwood and saw-timber sizes. Lumbering operations are comparatively easy because of the relatively smooth topography. About 20 percent of the land is cleared and in permanent pastures from which the stones have not been removed. Also, there are some old fields no longer cultivated, and some cultivated areas too stony to be included with Charlton loam. Much of the phase is potentially arable.

Charlton stony loam, steep phase (20–30% slopes) (Cr).—In profile characteristics this soil is like Charlton stony loam, but its slopes are much steeper, and its surface soil is thinner and somewhat lighter colored. The soil developed on deep till deposits similar to those underlying other members of the Charlton series. Fairly large regular tracts occur in the somewhat mountainous south-central and eastern parts of the county. These tracts are on the more hilly though not particularly rugged or broken slopes of ridges and mountainsides and are associated with Bangor, Colrain, Paxton, Hollis, and Sutton soils.

Charlton stony loam, steep phase, is largely forested. Perhaps 20 percent is in permanent pastures or orchards, and there are some blueberry fields.

COASTAL BEACH

Coastal beach (C), confined largely to the off-shore islands and small bays along the coast, is limited in extent. The beaches are generally sandy or gravelly and gently sloping. They are very short, rarely more than a quarter mile in length. Most of the sandy beaches occur at the heads or in the most curving parts of bays, whereas the gravelly beaches extend between islands, along promontories, and where the coast line is relatively straight.

The beaches are not large enough for commercial or public use, but are enjoyed by small private parties. They are usually reached by boat and are best at mid-tide. They are usually barren, although pea vines grow on some of the sandier areas.

COLRAIN SERIES

Soils of the Colrain series probably cover less than 10 square miles in this county. They have developed on deep loose limy schistose and phyllitic till containing many stones and boulders of limestone that have weathered to a rusty brown. The soils are variable in distinguishing characteristics because the deep till occurs between ledges of limy schist, and consequently the soil profiles are alternately very deep and extremely shallow.

Colrain soils are mainly on comparatively narrow ridges that join larger broad-topped ones commonly occupied by Bangor, Paxton, or Charlton soils. They occur also on the low-lying foot slopes of higher ridges, where they are associated with the Thorndike, Sutton, and Whitman and in isolated areas with the Dixmont and Burnham soils.

Part of the Colrain soil area is cultivated but most of it is in pasture, hayfields, and orchards. Colrain soils are well suited to most crops, including berries, vegetables, and oats. Apparently they are not well suited to potatoes where the pH of the surface soil is above approximately 5.4. The members of the Colrain series in this county are Colrain loam and its rolling and steep phases, and Colrain stony loam and its undulating and steep phases.

Colrain loam (0–8% slopes) (Cr).—This mellow moderately acid light-brown loam covers a relatively small total area. The small irregular bodies are on the tops of low-lying ridges where topography is smoothest. This soil is associated with the Charlton, which it resembles, and the Bangor, Thorndike, and Sutton. It is distributed in the western part of the county in Palermo.

The following describes a representative profile in a cultivated area:

0 to 8 inches, light-brown mellow loam with a soft crumb structure; moderately acid.
8 to 18 inches, brown to strong yellowish-brown firm but friable loam; moderately acid.
18 to 26 inches, yellowish-brown slightly firm loam to loose fine sand; moderately acid.
26 to 48 inches, pale-yellow to yellowish-green-tinged slightly compact but pervious gritty loam; slightly acid.
48 inches +, olive somewhat loose bouldery calcareous till; contains slabby fragments of calcareous micaceous schist in considerable quantity.

The average pH of the profile just described is 6.0, or medium acid. Fragments and pieces of rusty-brown partly rotted limy schist are scattered on the surface and throughout the profile. Some of these rock fragments have unweathered cores that effervesce when hydrochloric acid is applied. Included with this soil and indicated by appropriate map symbols are some rock ledges, seepage spots, and very stony patches, as well as eroded areas occurring in cultivated fields.

Colrain loam is used for the production of field or canning beans, canning peas, truck crops, small fruits, corn, oats, timothy-and-clover hay, and such crops. Potatoes are grown but are not recommended on this soil because of potato scab. The soil is easy to work because it dries out promptly in spring. Because of its good internal drainage, Colrain loam is ordinarily not subject to erosion.

Colrain loam, rolling phase (8–15% slopes) (Cu).—In essential profile characteristics this soil is similar to Colrain loam, but it has stronger slopes, is more susceptible to accelerated erosion, and is more extensive. The irregular small bodies are associated with Charlton, Bangor, and Thorndike soils and are distributed largely near North Palermo in the western part of the county.

In places this soil includes outcrops of limy schist and phyllite. These ledges are indicated by a symbol on the map where the soil between them is relatively deep. If the ledges are more numerous and the soil is shallow between them, the areas are included in the Thorndike series. Seepage spots and marshy areas are included with Colrain loam, rolling phase, as well as eroded patches of infrequent occurrence.

About half of Colrain loam, rolling phase, is cultivated. Practically the same crops are grown as on Colrain loam, but more emphasis is placed on production of pasture, hay, and orchard fruits. The emphasis on these crops keeps erosion to a minimum. Management practices are similar to those for Colrain loam, but yields of most crops are generally lower. Yields from orchard fruits are higher because this phase has better air drainage and there is less damage from frost.

Colrain loam, steep phase (20–35% slopes) (Cv).—Greater slope and numerous ledge outcrops and stones differentiate this soil from Colrain loam. It is associated with Charlton, Thorndike, and Bangor soils. The narrow irregular bodies occur on steeply sloping flanks of some ridges near Palermo and on low-lying rolling to hilly topography simulating that formed by morainic deposits. The parent material is slightly stony till. Ledge outcrops or stones are considered characteristic, but the phase is not stony enough to be regarded as a stony loam, nor is it sufficiently ledgy or shallow to be placed with the shallow soils. Included are limited areas with accelerated erosion and imperfectly or poorly drained spots.

Most of Colrain loam, steep phase, is in pasture, hay, and orchard crops. The soil is susceptible to erosion under cultivation, but because of its present use, is eroded only in a few minor areas where the cultivated slopes are steeper than usual. Management requirements for this soil are similar to those for Colrain loam; yields are approximately 10 to 20 percent lower.

Colrain stony loam (8–16% slopes) (Cw).—This is a friable moderately acid brown to brownish- or grayish-yellow soil. It is developed on deep stony limy schistic and phyllitic till, which is in places closely associated with the upstanding limy schist ledges that occur frequently. The soil is distributed in the western part of the county near Palermo. It is associated with Charlton soil, which it resembles, and Bangor, Thorndike, and Dixmont soils. The narrow irregular bodies occupy long rather narrow valley ridges dissected by stream channels. External drainage is good.

The following describes a representative profile in a forested area:

0 to 3 inches, dark-brown mixed organic matter and mineral soil material; moderately acid.
3 to 5 inches, light grayish-yellow loam to fine sandy loam, friable and of single grain structure; moderately acid.
5 to 8 inches, brown mellow friable loam of weakly granular to soft crumb structure; moderately acid.
8 to 24 inches, strong to moderate yellowish-brown slightly firm but friable fine sandy loam to loam; moderately acid.
24 to 42 inches, yellowish-brown, green-tinged, slightly compact gritty loam to fine sandy loam; slightly acid.
42 inches +, olive somewhat loose till; neutral to alkaline.

The entire profile contains boulders and fragments of calcareous schisty limestone. The carbonates are removed from some of these; others have unweathered cores. From place to place, profiles vary somewhat. The greatest variations are in the depth to underlying till, kind of the embodied rock fragments, textures of the surface layers, and color of the till, which varies from dull gray to relatively bright olive.

Included with this soil in mapping are the characteristic ledge outcrops and, in addition, some seep spots of slight extent and importance. Seepy areas are few because the favorable slopes generally provide good external drainage.

Most of the Colrain stony loam is covered with a moderately good stand of mixed northern hard and soft woods, including considerable arborvitae and some white pine and aspen. Pulpwood and cordwood are the dominant forest products.

Colrain stony loam, undulating phase (3–8% slopes) (Cy).—This soil is similar to Colrain stony loam in essential profile characteristics, though its surface layers may be somewhat thicker. Slopes are milder. The soil occupies smoother areas than any of the other Colrain stony loam soils and is more or less ledge-free. It is of small total extent and is distributed largely in the western part of the county near Palermo. The rather small regular bodies are associated with Charlton, Bangor, Dixmont, and Thorndike soils.

Most areas are wooded, but the soil is considered potentially arable because of its smooth topography, slight stoniness, and relative freedom from ledges. Some areas in abandoned fields have become stony because of frost heaving and erosion. Over a long period the heaving and erosion tend to increase the concentration of stones on the surface. Most of the abandoned fields are in brushy pastures or hay.

Colrain stony loam, steep phase (20–45% slopes) (Cx).—This phase embodies the essential characteristics of Colrain stony loam but has steeper slopes. The soil is comparatively uneroded and moderately stony. It includes a considerable number of ledge outcrops

and some seepy and marshy areas, the more outstanding of which are indicated on the map by symbols.

Colrain stony loam, steep phase, is well suited only for the production of wood products; most of it is now in farm woodlands or utilized for the production of pulpwood and cordwood. Under good management considerable saw timber could be obtained. Fire protection is necessary, as well as selective cutting to provide sufficient seed trees and to retain a suitable growth of young stock. Forestry practices are further discussed in the section on Forests.

DIXMONT SERIES

Soils of the Dixmont series, like those of Acton and Sutton, have developed on deep imperfectly drained till. They include limy schist and phyllite in their parent materials, however, and are generally heavier textured and slightly shallower than Acton or the Sutton soils. Dixmont soils may even include a few calcareous phyllitic or slate outcrops. They are associated primarily with the well-drained Bangor and Thorndike soils and the poorly drained Burnham soils. In transitional areas between calcareous and acid materials they may also be associated with the Charlton, Paxton, and Colrain.

Dixmont soils occur in low interstream or depressional areas throughout the county but are located primarily in the central and northwestern parts. They include both cleared and wooded land and usually support good crops of grain, hay, and timber. Potatoes and orchard crops are usually not well suited. The series is represented by Dixmont loam and its sloping phase, and Dixmont stony loam and its sloping phase.

Dixmont loam (0–8% slopes) (DA).—This soil developed on imperfectly drained till of composition similar to that underlying Bangor and Thorndike soils and also on valley-fill materials. Ordinarily the rounded or elliptical areas, a few to many acres in extent, are on broad-topped, stone-cleared, nearly level to gently sloping ridges. The soil is principally in the central and northwestern parts of the county near Unity and Thorndike; small scattered areas occur elsewhere. It is associated mainly with Bangor, Thorndike, and Burnham soils but occurs in transitional areas with the Charlton and Colrain. The surface soil is rather dark, and the subsoil is mottled. The dark surface soil contrasts sharply with the lighter colored surface layers of Acton and Sutton soils.

The following describes a profile of Dixmont loam in a cultivated field:

0 to 6 inches, very dark grayish-brown loam of fine granular to soft crumb structure; moderately acid.
6 to 10 inches, yellowish-brown firm but friable loam; moderately acid.
10 to 15 inches, pale yellowish-brown loam slightly mottled with gray; moderately acid.
15 to 36 inches, yellow mottled with gray heavy loam; only slightly compact; somewhat platy breakage; moderately acid.
36 inches +, gray to olive compact fairly dense gritty till; contains many small dark phyllitic chips; semisaturated; alkaline to mildly calcareous.

The profile varies less than that of any of the other imperfectly drained soils.

Dixmont loam is used for cultivated crops, small fruits, pasture, or hay. Most of the cultivated land is in oats, corn, peas, beans, and

some potatoes; the remaining stone-cleared areas are in pasture or hay. Although the soil is generally not suitable for orchards, they have been grown in a few places where the land is drained. Hay, beans, peas, oats, and other crops give rather high yields, some of which are tabulated in table 6, p. 110. Cultivated areas show slight erosion, and the more eroded areas are usually shown on the map by symbol.

Dixmont loam, sloping phase (8–16% slopes) (DB).—Although similar to Dixmont loam in many respects, this soil generally occurs at higher elevations on shallower till. Except in eroded areas where surface layers are thinner or missing, it is much like Dixmont loam in profile characteristics. The soil occupies rather small irregular areas along the sides of deep and shallow till ridges in the central and northern parts of the county. In places it is associated with the shallower Thorndike and the deeper Bangor soils. An occasional boulder, ledge, or a few scattered stones may occur on this soil. Included with this soil in mapping are occasional marshes and small tracts of saturated Burnham soil.

Most of Dixmont loam, sloping phase, is used for pasture and hay. Approximately 60 percent of the land is cultivated and may be slightly to moderately eroded. Most erosion is not severe enough to require conservation practices other than long rotations or across-the-slope tillage. Good hay and pasture are produced. The soil is slightly acid and needs less lime than the Charlton soils.

Dixmont stony loam (0–8% slopes) (Dc).—This imperfectly drained soil developed on stony till similar to the well-drained till of the Bangor and Thorndike. The soil occupies rather large regular areas near Thorndike and Unity. Rounded granitic, gneissic, and schistic stones and boulders 10 to 30 inches in diameter are scattered prominently over the surface. More or less hidden by pasture grass, or if forested, by undergrowth, are many 2- to 5-inch subangular flattened stones of limy schist and calcareous quartzite or phyllite. These stones effervesce if hydrochloric acid is applied on fresh fractures. Occasional outcrops of limy schist and phyllite may also occur. Most of Dixmont stony loam is wooded; it supports good stands of birch, maple, ash, hemlock, spruce, and arborvitae.

The following describes a representative profile in a forested area:

0 to 3 inches, dark to very dark brown stony loam of coarse crumb structure; moderately acid.
3 to 6 inches, light-brown mellow loam; moderately acid.
6 to 10 inches, pale yellowish-brown firm but friable loam, moderately acid.
10 to 36 inches, slightly mottled gray, yellow, and rust-brown material fairly compact and somewhat platy in breakage; moderately to slightly acid.
36 inches +, gray to olive compact fairly dense gritty till; contains many small dark phyllite chips and some granitic gravel and boulders; neutral to alkaline.

The entire profile contains some granitic boulders. Surface layers are everywhere much alike, but because the soil varies in degree of saturation, there is some variation in the subsoil. Included with this soil are small tracts of Burnham soil. In orchards, pastures, and other cleared land these tracts are shown by symbol; they are not indicated in timbered areas.

Dixmont stony loam, sloping phase (8–16% slopes) (Dd).—Profiles of this soil are similar to the one described for Dixmont stony

loam. The two soils are much alike. This one, however, because of the more frequent occurrence of seepage areas, is a little more saturated. A few marshy areas may occur. Most of Dixmont stony loam, sloping phase, is forested. It supports good stands of mixed conifers and hardwoods. Cutting of pulpwood is extensive, and large areas are now in slash, or young growth.

ETNA SERIES[7]

Soils of the Etna series are generally on rough glacial outwash and have rolling to strongly rolling or hilly topography, which includes such land forms as horsebacks (eskers), kames, crevasse fillings, and pitted plains. The soils occur along ancient glacial stream channels and lakes. Two or three areas several miles in length are in the northwestern part of the county and one is near Monroe, but the total area of Etna soils is not large. Soils of the Etna series are associated primarily with the Stetson, Melrose, and Sudbury on other outwash, and with the gravelly Charlton, Colrain, and Bangor on till.

Etna soils are composed largely of mixed sand and gravel. The deeper deposits are slightly limy. Colors range from pale brown or yellow in the surface soil, to gray in the subsoil, and then to rather dark olive in the substratum. As a rule, Etna soils are porous. The complex of Etna-Hartland very fine sandy loams, however, has textures ranging from coarse sand to fine sandy loam because it contains clay and fine sand in addition to the gravel and cobblestones characteristic of normal Etna soils.

Except for a few fields on Etna fine sandy loam, Etna soils are normally not cultivated. About half the area they occupy is now in pine, aspen, yellow birch, some oak, and other species typical of the mixed northern hardwoods and coniferous forest. The other half is grazed, although some of the pastures are rather brushy. The series includes Etna fine sandy loam, Etna gravelly sandy loam and its hilly phase, Etna loamy sand and its hilly phase, and Etna-Hartland very fine sandy loams with the eroded, eroded hilly, and hilly phases.

Etna fine sandy loam (8–16% slopes) (Ea).—The deposits on which this soil occurs are the finest textured ones for the Etna series. Most of this soil is associated with cultivated soils of the Stetson, Melrose, and Charlton series. The rather long irregular narrow areas occur throughout the county where glacial streams have passed. They are particularly noticeable in the northwestern corner and near Monroe and the lakes. Slopes are mainly between 8 and 16 percent but sometimes reach 25 percent. Because most of the land has been or is tilled, it shows the effect of erosion, particularly wind erosion along the crests of some cultivated knolls.

Profiles of this soil are somewhat irregular because there are inclusions having other textures. Surface layers may be finer or coarser in texture, but for the most part, profiles in cultivated fields are like the one described in the following:

0 to 7 inches, dark-brown mellow fine sandy loam of soft crumb structure; moderately acid.

[7] In Waldo County the Etna soils were separated from the Stetson soils primarily on the basis of topographic differences. In recent years this basis has not been considered a series criterion and these soils are now recognized as slope phases of the Stetson series.

7 to 16 inches, brownish-yellow slightly firm fine sandy loam having a soft crumb structure; moderately acid.
16 to 38 inches, pale grayish-yellow firm but friable fine sandy loam; moderately acid.
38 to 72 inches, dark-gray loamy fine sand and some gravel; slightly compact in places; slightly acid.
72 inches +, dark-gray sand and gravel (slaty) coated with lime; alkaline.

The entire profile contains slaty gravel and some that is granitic and quartzitic. Pebbles having many brown spots occur between depths of 38 and 72 inches; these mark the location of lime-bearing rocks from which carbonates have been removed. Included with this soil are some gently rolling areas of Stetson fine sandy loam and a few of Stetson loamy sand.

Approximately 70 percent of Etna fine sandy loam is cultivated; the rest is in hay and pasture. The cultivated land is most often used for field corn, oats, potatoes, and small fruits. In spite of its tendency toward droughtiness during years of low rainfall, it is also frequently used for canning corn, peas, and beans. Yields are generally high when fertilizer and lime requirements are met, and low if they are not. Orchards should do well, for air and internal drainage are favorable to fruit trees.

Etna loamy sand (8–16% slopes) (EH).—The deposits on which this soil occurs are the sandiest of the Etna series and are comparatively free of gravel. The relief is generally rougher than that of Etna fine sandy loam, although the slope range is the same. The soil occurs on rolling to moderately hilly kames and eskers in the central part of the county and is associated with Stetson, gravelly Charlton, and other soils from outwash.

The soil is less limy in the upper part of its profile than others of the Etna series but just as alkaline in the lower. The following profile from a wooded tract is representative:

0 to 3 inches, pale grayish-brown loose loamy sand; acid.
3 to 5 inches, light-gray loose loamy sand; acid.
5 to 8 inches, dark-brown firm but friable loamy sand; acid.
8 to 24 inches, brownish-yellow loamy sand and some gravel; fairly loose and open; acid.
24 to 45 inches, pale-yellow loamy sand and some fine gravel; moderately acid.
45 to 72 inches, dark-gray fine gravel and sand; slightly acid.
72 inches +, dark-gray loose fine sand and beds of fine gravel; alkaline.

The profile is fairly uniform and usually contains much more sandy material than gravel. Included, however, are some areas on small kames or low eskers composed predominantly of gravelly material. In these the soil is loamy sand or coarse sand to depths of 20 to 30 inches.

About 20 percent of Etna loamy sand is cleared and cultivated, but it is very droughty. Crop failure is almost certain under adverse weather conditions. Most of the land is wooded. There are, however, some thrifty stands of white pine. Where areas are not burned over, reforestation is usually rapid; those frequently burned over for brushy pasture and blueberries reforest slowly or the growth is limited to aspen, scrub oak, maple, or other fire-tolerant species.

Etna loamy sand, hilly phase (20–30% slopes) (EK).—This soil occupies the steeply sloping sides of pitted outwash plains and other

areas of rough glacial outwash. Sand pits occur frequently. The profile is similar to that described for Etna loamy sand but includes coarser material and gravel. The soil is associated with the same soils as Etna loamy sand, though it occurs more frequently with those on steeper land.

None of the soil is cultivated, although some may be cleared and in brushy pastures (pl. 5, *A*). Mixed stands of pine, aspen, maple, and some dwarf juniper grow on far the largest part. Fires and the droughtiness of the soil have delayed the development of a good forest cover; consequently, most stands are poor. Sand sold for building purposes provides the only real source of income from this soil.

Etna gravelly sandy loam (8–16% slopes) (Eb).—This well-drained soil occupies moderately rolling to rolling kames and eskers or other rough outwash. It is like Etna loamy sand in topography and has the same slope range. As with the hilly phase of Etna loamy sand, small gravel pits frequently occur on the eskers. Some of the eskers are prominent and extend several miles across the county northwest of Unity Pond. In fact, most of the eskers in the county are mapped as Etna gravelly sandy loam with gravelly loamy sand inclusions.

The soil is associated primarily with Stetson, gravelly Charlton, and Bangor soils in the central and eastern parts of the county, and to some extent with Hermon soils in the northeastern part. As a whole it is much more gravelly than any of the other soils from outwash but less stony than the gravelly Charlton and Bangor soils developed from till. The gravel is composed of gneiss, phyllite, quartzite, and some granite and is rather uniformly 2 to 4 inches in diameter. The gravel is lime-coated in the lower part of the soil.

Profiles of this soil are more or less irregular because of variations in the gravel content and in the bedding of the sand and gravel in the substratum. Considered representative, however, is the following profile from a pasture:

0 to 7 inches, dark-brown loose gravelly sandy loam; moderately acid.
7 to 15 inches, brownish-yellow loose gravelly sand; moderately acid.
15 to 38 inches, pale-yellow slightly compact loamy fine sand to loamy sand; moderately acid.
38 to 72 inches, dark-gray slightly compact coarse sand and gravel; moderately acid.
72 inches +, dark-gray coarse sand and gravel; less compact than layer above and some of it coated with lime.

The entire profile contains some fragments of dark phyllite, which is more or less limy below 72 inches. The gravel consists of granite, schist, and slaty material. Areas where the gravel is larger than normal, as well as bodies of gravelly loamy sand, are included with this soil.

Approximately 20 percent of Etna gravelly sandy loam is cleared for pastures and hay and an additional 20 percent is cultivated to beans, peas, corn, and small fruits. Potatoes are not usually grown in such coarse soil, because yields and harvesting are adversely affected by the gravel. Because of the general droughtiness of the soil, fruit trees are not grown. Fields are usually abandoned after a few years of cultivation.

The areas of gravelly loamy sand included with this soil are predominantly wooded. They support some good white pine, oak, ash, aspen, and maple timber and some brushy pastures of aspen and yellow birch.

Etna gravelly sandy loam, hilly phase (20–30% slopes) (Ec).—In many respects this soil is similar to Etna gravelly sandy loam, but it is located on the steepest parts of rough glacial outwash and has steeper slopes. The areas are on long winding gravelly kames and eskers and are usually narrow. This phase is associated with about the same soils as Etna gravelly sandy loam and occurs principally in the northern and western parts of the county.

The soil profile is much like the one described for Etna gravelly sandy loam, though the surface gravel is sometimes larger and may range from 1 to 6 inches in diameter. Most of the gravel is composed of gneiss, quartzite, schist, and some phyllite and granite. Nearly all of the gravel is dark-shaded and limy in the substratum.

Some fairly good stands of aspen and pine pulpwood or cordwood are on this soil, but the largest income is from the sale of sand and gravel. The land is too droughty for crops and none of it is cultivated.

Etna-Hartland very fine sandy loams (8–16% slopes) (Ed).—This complex is located in the northeastern and central parts of the county and is associated with Hartland, Suffield, Stetson, Etna, Sudbury, and the gravelly Charlton and Bangor soils. It occurs on rolling to slightly hilly land with slopes of 8 to 20 percent and is generally very well drained. The Etna parts of the complex are definitely on kames or eskers; the Hartland parts may be on rather deep pockets of silt and clay or on thin layers of silt, very fine sand, and clay. The two soils of the complex occur side by side, and profiles of clay or of sand and gravel may be only inches apart. The profiles generally follow those described elsewhere for the Etna and the Hartland or Suffield soils.

About 60 percent of the land is cultivated, and the rest is in pasture or hay. Canning corn, beans, potatoes, oats, and hay are the principal crops. A wide variety of crops can be grown, but yields are apt to be irregular because of the mixed soils. Fields frequently have odd shapes because the most gravelly and sandy parts of them have been excavated for building material and the clay spots or wooded areas have been left in brushy pasture. Because much of this complex is tilled and the member soils are very fine sandy loams, there may be some slight sheet or wind erosion. Areas noticeably eroded are mapped as the eroded phases of Etna-Hartland very fine sandy loams.

Etna-Hartland very fine sandy loams, eroded phases (8–16% slopes) (Ef).—The soils of this separation occupy gently rolling topography and are developed on mixtures of sand and gravel in kame or esker areas and on clay deposits. They are associated with the same soils as the normal phase of the complex but occur mainly on dissected areas of clay and sand in the northeastern part of the county. The profiles of the soils in this complex are similar to those of the same soils mapped separately, but the surface layers have been subject to erosion

and may be greatly truncated or lacking. A few stones and rock outcrops occur on this complex; those that interfere with cultivation are usually indicated on the map by symbol.

Nearly all this land is either actively cultivated or has been recently. The fields show noticeable sheet and some gully erosion because a greater part of the complex is Hartland clay or silt rather than Etna sand. On slopes exceeding 12 percent, clayey areas erode much more rapidly than sandy ones. Potatoes are seldom grown, though good yields of oats, beans, peas, and canning corn have been obtained.

Etna-Hartland very fine sandy loams, hilly phases (16–30% slopes) (Eg).—In this separation are the hilliest and steepest parts of the Etna-Hartland complex. Usually in the Etna part of the complex there is more gravel, and in the Hartland part the clay frequently occurs as deep pockets and is banked against the side of a kame or esker. The complex occurs mostly in the northeastern part of the county, but there are scattered areas elsewhere. It is associated with the Hartland, Etna, Stetson, and Melrose soils. The member soils of the complex have profiles similar to those they have where mapped separately, but may vary more in thickness and arrangement of layers. Included in mapping are terrace escarpments of mixed clay and sand or gravel.

Nearly all of Etna-Hartland very fine sandy loams, hilly phases, is in timber, pasture, or hay. This complex would be subject to severe erosion if cultivated. Pastures and hay tend to burn out during dry spells. Good stands of white pine, oak, fir, beech, birch, maple, and spruce occur.

Etna-Hartland very fine sandy loams, eroded hilly phases (16–30% slopes) (Ee).—Long narrow irregular areas of this complex are in the northeastern and central parts of the county. The relief is rather hilly. Because the land is cultivated, or has been recently, most of it is subject to considerable sheet erosion and some gullying. The streamlets cut into the patches of clay and sand at a different rate than they cut into the clay and gravel. The result is gullying.

The member soils of this separation are associated with the same soils as the normal phase of the complex, but may also be associated with Melrose and other soils having mixtures of sand and clay. The soils mapped together in this separation have profiles similar to those described where they are mapped separately, but the surface layers may be very thin or lacking because of erosion. There are a few outcrops or heaps of boulders.

Nearly all this land is cultivated. Fields are rather small, however, and crops are usually restricted to garden vegetables, canning peas, beans, and corn, and small fruits. On the least steep areas there are some improved pastures, and these may be rotated with corn and oats. Crop yields are not particularly high.

FRESH WATER MARSH

This land type occurs in proximity to nearly all the lakes of Waldo County, primarily as bays and as intermittent extensions of the permanent parts of the lakes. Good examples may be found around Pitcher and Hurds Ponds and the South Branch Marsh River.

Most of the Fresh water marshes are acid and are often covered with a mat of weeds, sedges, and other water-tolerant plants. Large

glacial boulders, occurring singly and in clumps, are a prominent feature of many of the marshes. Most of the marshes are underlain by silty sediments about a foot deep. Gravel bars and sandy kames frequently intrude into the marshes located in the central and southern parts of the county. Elsewhere the shores are generally stony or cobbly.

The Fresh water marshes are similar in general appearance to Tidal marshes along the coast but are quite different in salinity and saturation. Fresh water marshes are never salty and as a result support a much wider variety of vegetation. They also may become tinder-dry and a fire hazard during droughty periods, whereas the Tidal marshes are periodically saturated by the ebb and flow of the tides.

The extreme seasonal variations in wetness of Fresh water marshes prevent their use for agriculture. Many are saturated the year round, however, and some may even have a thin layer of muck. This layer, if drained, might support such crops as celery or corn. The cost of such development, however, would be excessive under pressure economic conditions. In addition, areas that would lend themselves to development are isolated and difficult to reach.

GREENWOOD SERIES

Soil of the Greenwood series is composed of organic deposits—partially decomposed sphagnum moss. These deposits occurs in bogs, are of variable depth, and remain saturated most of the time. The Greenwood series is represented by only one type, Greenwood peat.

Greenwood peat (0–3% slopes) (Ga).—This peat soil occupies open, distinctly dome-shaped bogs. The centers of the bogs are carpeted with sphagnum moss and low-growing heath bushes. The ponds or marshes prominent in areas of Littlefield peat do not occur. A thin fringe of black spruce trees may grow around the margins but not in the centers of Greenwood peat bogs.

Greenwood peat has developed from deposits of sphagnum moss. In this county the deposit of moss is not much more than 2 feet deep and it grades into layers of both sedge and woody peat. At a depth of 10 to 15 feet these layers terminate in a mineral soil of micaceous sandy clay. Greenwood peat is associated with the Scarboro, Biddeford, and other poorly drained soils, with muck, and with soils of the Stetson, Etna, and Hartland series. The only thick deposit of Greenwood peat in the county is in Herricks bog south of Belfast. The peat deposit is not large enough for commercial development and the land has no value for timber or other uses.

The following describes the only profile obtained in the county:

0 to 6 inches, coarsely fibrous matted cover composed of light-brown sphagnum moss and roots of bushes.
6 to 14 inches, brown loose coarsely fibrous sphagnum moss peat.
14 to 24 inches, brown fibrous sphagnum moss peat.
24 to 120 inches, dark-brown bands of compact and loose to firm finely fibrous and sedimentary woody and sedge peat.
120 to 180 inches, bright-brown slimy fibrous sedge and sedimentary woody peat.

The profile varies largely according to the depth of sphagnum moss, which may extend through the deposit or terminate on other peat at depths of 24 to 48 inches.

HARTLAND SERIES [8]

Soils of the Hartland series occur along Penobscot Bay and are developed entirely on rolling and steep dissected areas of uplifted geologically eroded marine or, in places, lacustrine deposits of silt and clay. Most of this heavy material is well to somewhat slowly drained internally, and it may be very well to excessively drained externally. Frequently the Hartland soils occur near mountains or other geologic formations (see pl. 5, *B*), where they are associated with soils of the Hermon, Canaan, Hollis, and Westford series. They are usually associated with Suffield soils, which are from similar material but occupy smoother relief.

Hartland soils are severely dissected by innumerable incipient and established drainageways. Normally they include no stones or ledges and only a few erratics. In this county, however, the tracts of Hartland soils are comparatively small and may have a few scattered stones and erratics along stream channels and near intrusions of stony till. The series is represented by Hartland fine sandy loam and its steep, severaly eroded, and severely eroded steep phases; by Hartland silt loam and its eroded, steep, and severely eroded steep phases; and by the Bangor-Hartland stony complex (see p. 30), an intricate mixture of Bangor and Hartland soils.

Hartland fine sandy loam (8–16% slopes) (H$_A$).—This soil has developed from marine or lake-laid silts and clays over which there is a 6- to 12-inch sandy covering. The soil is most extensive in the northeastern part of the county along the Penobscot River and on the lowlying areas around Mount Waldo. It usually occurs as comparatively narrow bands on gently rolling slopes along stream valleys. Dissection is not so extreme as on Hartland silt loam.

This soil is associated with the Adams, Melrose, and Suffield, and in transitional areas with the Bangor, Hermon, and Charlton soils. It frequently occurs adjacent to soils on gravelly outwash, stony till, or ledge land and may include some small patches of them.

This soil is more variable than Hartland silt loam because of its fine sandy loam surface layer. Most of it has a profile similar to the one described in the following:

0 to 5 inches, brown to grayish-brown fine sandy loam having a weak crumb structure; strongly acid.
5 to 10 inches, yellowish-brown to grayish-yellow mellow fine sandy loam of weak crumb structure; strongly acid.
10 to 18 inches, pale yellowish-brown firm but friable fine sandy loam; strongly acid.
18 to 30 inches, gray to yellowish-gray slightly compact fine sandy clay loam; strongly acid.
30 to 40 inches, gray to yellowish-gray silty clay loam to clay loam; medium acid.
40 inches +, dark-gray banded silty clay and clay to a depth of 6 feet or more; slightly acid.

Some slight sheet erosion normally occurs on this soil; small areas more severely eroded are shown by erosion symbols.

[8] In Waldo County the Hartland soils were separated from the Suffield soils primarily on the basis of topographic differences. In recent years this basis has not been considered a series criterion, and these soils are now recognized as slope phases of the Suffield series.

Most of Hartland fine sandy loam is in pasture or hay; about 20 percent is tilled. The sandy surface soil tends to resist erosion and aids cultivation. Corn, potatoes, canning peas and beans, garden vegetables, and small fruit grow well, as do a few orchards near Winterport.

Hartland fine sandy loam, severely eroded phase (8–16% slopes) (HB).—Small irregular tracts of this soil occur in the northeastern and central parts of the county and are associated with the same soils as Hartland fine sandy loam. The soil is entirely in cultivation and has been eroded. The sandy layer over the clay may be not more than 4 inches thick because of erosion. The surface soil is therefore lighter colored and thinner than that of Hartland fine sandy loam. Relief also differs in being somewhat steeper and more rolling. Slopes range from 6 to 22 percent, but the dominant range is 8 to 16.

Usually enough fine sandy loam surface soil remains on this severely eroded phase to give good yields of vegetables, small fruits, oats, millet, corn, and potatoes. As on Hartland silt loam, apples are not grown on this soil because the clay subsoil is too close to the surface for fruit trees. Conservation practices such as contour tillage, terracing, strip cropping, and use of long rotations are needed to control active erosion.

Hartland fine sandy loam, steep phase (20–35% slopes) (HD).—Virtually uneroded steep areas of this soil occur next to drainage channels of the Penobscot River and along Penobscot Bay. The profile is similar to the one described for Hartland fine sandy loam. Except along incipient gullies caused by geologic erosion, the fine sandy loam surface soil is as deep, or deeper, than that of Hartland fine sandy loam. Included with this phase in mapping are some ledges exposed in cutbanks. Areas having surface stoniness or ledges are indicated by map symbols.

Most of Hartland fine sandy loam, steep phase, is wooded or in pasture. Though inextensive, it has potential value for sodded orchards or timber. It normally supports a good stand of mixed northern hardwoods, hemlock, fir, and spruce trees, but these have been depleted by lumbering. Pastures are good if there is sufficient rainfall. There are no signs of sheet erosion on this soil, but terracing and other erosion control practices would be necessary to maintain yields if it were cultivated.

Hartland fine sandy loam, severely eroded steep phase (20–35% slopes) (HC).—This soil is similar to the steep phase of Hartland fine sandy loam but is subject to more pronounced sheet and gully erosion. Its relief is steeper than that of the steep phase and may be much more irregular and rolling because of stream dissection. In profile this soil is similar to Hartland fine sandy loam, though the surface layers are much thinner over the underlying clay.

Most of this phase is cultivated; corn, beans, oats, and hay are the principal crops. The soil requires complex practices for erosion control, and important among these are diversions, contour strip cropping, and long rotations. Few slopes of more than 25 percent are cultivated, but gully erosion usually extends into the steeper areas even though they are not cultivated.

Hartland silt loam (8–16% slopes) (He).—This soil is mainly on gently rolling dissected areas of silt and clay in the northeastern part of the county around Winterport. It occupies rather smooth tongues of land between drainageways. The bodies are small and rather irregular and their total area is not large. The soil is associated primarily with Suffield and other well-drained soils derived from clay or silt (pl. 5, *B*) but also occurs with the imperfectly drained Buxton and poorly drained Biddeford soils around the lake-laid silts in the central part of the county.

The following describes a representative profile from a pastured area:

0 to 6 inches, brown to grayish-brown mellow silt loam of weak crumb to fine granular structure; strongly acid.
6 to 12 inches, yellowish-brown to grayish-yellow silt loam to silty clay loam; strongly acid.
12 to 20 inches, yellow to pale yellowish-gray silt loam to silty clay loam, faintly mottled gray and yellow in lower part; strongly acid.
20 to 30 inches, gray to yellowish-gray compact silty clay to clay; slightly acid.
30 to 38 inches, gray to dark-gray compact clay to silty clay; plastic or hard depending on moisture condition; slightly acid.
38 inches +, dark-gray compact clay and silty clay, often bedded; slightly acid to neutral.

The profile varies mostly in the surface layers, which are eroded to some extent in cultivated areas; otherwise the soil is rather uniform because it developed from uniform parent material. Boulders, stones, and ledges are not usually present; they do occur in transitional areas between this soil and the stony or ledgy ones. Included with this soil in mapping are imperfectly drained spots normally occurring along incipient drainage channels and a few areas of less than normal slope range that would have been mapped as Suffield soils had they been extensive enough.

About 10 percent of the Hartland silt loam is cultivated, some 30 percent is wooded, and the rest is in pasture and hay or special crops. The principal crops are oats, corn, and hay. The cultivated land requires contour tillage, strip cropping, and long rotations to retard erosion.

Hartland silt loam, eroded phase (8–16% slopes) (Hf).—Rather narrow irregular bands of this soil occupy noticeably eroded rolling areas in the northeastern part of the county. These tracts occur where streams are cutting into the silt and clay deposits. Slopes range from 6 to 22 percent but are dominantly between 8 and 16. This phase is associated with Suffield, Melrose, and other Hartland soils. Its profile is essentially similar to the one described for Hartland silt loam but surface layers are much thinner, primarily because of sheet and rill erosion. There are also some deep gullies.

Nearly 80 percent of Hartland silt loam, eroded phase, is tilled. It produces good crops of corn, oats, berries, and hay. A few potatoes are grown but yields are low.

Conservation practices such as contour tillage, long crop rotations, and strip cropping will control most erosion on this soil.

Hartland silt loam, steep phase (20–50% slopes) (Hh).—This soil occurs on steeply rolling or sloping dissected areas, mostly along the Penobscot River near Winterport. It usually occupies narrow irreg-

ular bands next to the streams and is associated with Suffield soils and the Etna-Hartland very fine sandy loams. The soil is well but somewhat slowly drained and is usually free of stone and ledges. Except for thinner surface and subsurface layers, the soil profile is similar to that given for Hartland silt loam. The maximum slope range is 16 to 50 percent, but slopes are dominantly between 20 and 50.

Hartland silt loam, steep phase, is commonly in permanent pasture or forest, particularly in the mountainous areas. Probably 75 percent of it is timbered. There are good stands of spruce, hemlock, fir, white pine, birch, oak, and maple. In spite of this cover, geological dissection is so rapid that the streamlets have cut miniature gorges. Complex practices would be needed to control erosion if this soil were cultivated. It is recommended that such steep clay land be kept in permanent grass or timber.

Hartland silt loam, severely eroded steep phase (20–30% slopes) (HG).—Restricted to this phase are the steepest cleared areas of Hartland silt loam. The rather narrow irregular areas extend along the Penobscot River and Bay, and for the most part occur in abandoned or actively cultivated fields.

This severely eroded soil is similar to Hartland silt loam in the lower part of its profile. The upper part is greatly truncated or missing. The soil is associated chiefly with others developed from clay—the Suffield, Buxton, and those Melrose soils occurring on escarpments—and with the steep phase of Hermon soil.

Most of Hartland silt loam, severely eroded phase, is pastured or in hay; some is cultivated; and the rest is in young timber. The steepest and most dissected parts are usually in brush or young growth, whereas the areas of gentler relief are tilled. Yields on this phase are low and it should be kept in grass or timber. Erosion has affected both the cultivated and wooded areas, so both must be included in conservation practices. Even fairly large wooded tracts have old gullies and eroded clay "slips" that show how active erosion was on the land when it was cleared.

Included with this soil are some areas of steep and eroded Hartland fine sandy loam. If the remnants of the fine sandy loam surface layers are cultivated into the underlying silty clay layer, these included eroded steep areas will need the same treatment as this phase of Hartland silt loam. Included also with the severely eroded steep phase of Hartland silt loam are areas of wooded cutbanks. These are included because of the effect erosion has had on the growth of timber.

HERMON SERIES

Soils of the Hermon series are developed on well-drained deep to moderately deep, loose to slightly compact, more or less porous glacial till. The till is composed largely of granite, pegmatite, gneiss, and small quantities of schist, phyllite, and other metamorphic rock. Stones, some sand and gravel, and granitic boulders 4 to 6 feet in diameter commonly occur, but there are usually no ledges.

In this county Hermon soils are usually confined to kamelike till deposits with more or less rolling relief and to stony till deposits near Mount Waldo. Nevertheless, they do occur in some places on both fairly smooth and rough land.

The series is represented in this county by Hermon fine sandy loam and its eroded sloping, sloping, and steep phases; Hermon stony fine sandy loam and its undulating phase; and Hermon very stony fine sandy loam.

Hermon fine sandy loam (3–8% slopes) (HI).—This is a mellow stone-cleared well-drained soil of moderately low natural fertility. It developed on deep well-drained granitic till and occurs on undulating topography, usually along the tops or gentle side slopes of till-deposit ridges (pl. 6, *A*). Individual areas are small and distributed mainly in the northeastern part of the county, where they are associated with shallow Canaan, imperfectly drained Acton, and poorly drained Whitman soils around Mount Waldo and Swan Lake (pl. 6, *B*).

The following gives some of the important profile characteristics of Hermon fine sandy loam as it occurs under cultivation:

0 to 6 inches, pale-brown mellow fine sandy loam.
6 to 8 inches, brown mellow fine sandy loam.
8 to 18 inches, yellow-brown firm but friable sandy loam.
18 to 24 inches, pale yellowish-brown slightly firm fine sandy loam.
24 to 30 inches, yellowish-gray loose fine sandy loam.
30 to 48 inches, gray slightly compact sandy loam till containing subangular boulders.
48 to 240 inches +, gray loose sandy granitic till.

The entire profile is medium acid. A few stones and boulders are normal for the soil.

Included with this soil are some small areas of loam texture, many small bodies of sandy loam, and infrequent patches of gravelly sandy loam. A few very small imperfectly or poorly drained areas and a few ledge outcrops are also included.

Approximately 90 percent of Hermon fine sandy loam is cleared and under cultivation. Potatoes, corn, oats, some hay, and small fruits such as blueberries are produced. The soil is not inherently fertile but it responds well to good management. Moderate to heavy applications of barnyard manure and commercial fertilizer are required for best yields. Because of the gentle slopes and permeability of this soil, erosion is not a serious problem. In most places probably less than 25 percent of the surface soil has been removed by erosion.

Hermon fine sandy loam, sloping phase (8–16% slopes) (HK).—Except for thinner surface soil, a few more stones and boulders, and steeper slopes, this soil is similar to Hermon fine sandy loam. The soil occurs on the sloping sides of till ridges and in kamelike areas on glacial valley fill. Individual areas are rather large and are distributed generally around Mount Waldo in the northeastern part of the county, where they are associated with Canaan, Acton, and Whitman soils (pl. 6, *B*). The minor inclusions are about the same as are included with Hermon fine sandy loam. The included ledges and gravelly and imperfectly or poorly drained spots are indicated on the map by appropriate symbols.

About 60 percent of Hermon fine sandy loam, sloping phase, is under cultivation, although it is more subject to erosion than Hermon fine sandy loam. On slopes of 12 percent or less erosion losses are not excessive under ordinary tillage methods and may not exceed 25 percent of the surface soil. Where larger losses have occurred, they

usually appear to result from incorrect tillage rather than from the steepness of the slope or the erodibility of the soil.

Management requirements, crops, and yields are about the same as for Hermon fine sandy loam. The steeper slopes of this soil afford adequate air drainage. It is therefore well suited to orchards, whereas Hermon fine sandy loam is not. Yields of 225 bushels an acre of apples have been reported for this soil.

Hermon fine sandy loam, eroded sloping phase (8–16% slopes) (HJ).—Except for its steeper slopes and a surface soil unevenly truncated by erosion, this soil is similar to Hermon fine sandy loam. In places the entire surface soil is gone and somewhat rounded and elliptical spots of lighter colored subsoil are exposed. Not more than 2 or 3 inches of surface soil remains anywhere, and evidence of erosion is apparent along fence rows and at the bases of slopes, where some of the eroded soil material is deposited as miniature alluvial fans. Considerable rill activity is evident on the slopes.

Limited areas of this phase occur along the crests of hills and on slopes adjacent to drainage channels. It is distributed in the northeastern part of the county in association with Canaan and Acton soils. All of it is more or less continuously cultivated. The usual crops are corn, potatoes, field beans, peas, and other garden vegetables. Yields are a little lower than for Hermon fine sandy loam, but fertilizer applications are about the same. Frequently crop rows extend up and down the slopes, and erosion is thereby accelerated. Contour strip cropping and, in some instances, diversions should be used to control runoff.

Hermon fine sandy loam, steep phase (20–45% slopes) (HL).—This soil is similar to the Hermon fine sandy loam but may have a few more stones and occasional erratics of considerable size. Generally, the soil is stone-cleared; the stones are collected in piles in the fields or placed in fences. It is located in the northeastern part of the county around Swan Lake and Mount Waldo. The fields are usually narrow and irregular, but they may be extensive on the broader less steep parts of ridges and mountainsides. Included are small seepage areas and some shallow land adjacent to the Canaan and Acton or Whitman soils. If these included areas are in cultivated fields, they are shown by map symbols.

A small amount of Hermon fine sandy loam, steep phase, is now tilled. Most of it is used for apples, blueberries, hay or permanent pasture, yields of which are fairly high when fertilizers are used. The blueberries are produced without fertilizer or lime, but arsenate dust is applied to control insects.

Hermon stony fine sandy loam (8–16% slopes) (HM).—This soil is similar to Hermon fine sandy loam but is stonier and somewhat more strongly sloping. It occupies generally rolling to sloping hills, valley walls, and mountainsides and is distributed in the northeastern part of the county. Rather large bodies are associated with Canaan, Acton, and Whitman soils.

The soil is largely in forest consisting of red and white oaks, other northern hardwoods, and white pine. Timber yields are high, and the stands are usually easily accessible. The stones and boulders in

the soil vary from pebble size to 4 feet in diameter, the average range being from 10 to 20 inches. The stoniness does not affect timber growth or management.

The following describes a profile in a forested area:

0 to 4 inches, dark-brown to blackish-brown partly disintegrated mixture of organic matter (duff) and stony fine sandy loam.
4 to 8 inches, light-gray loamy fine sand to fine sand of single grain structure.
8 to 12 inches, brown fluffy fine sandy loam.
12 to 24 inches, yellowish-brown firm but friable fine sandy loam.
24 to 40 inches, pale yellowish-gray slightly firm sandy loam.
40 to 60 inches, gray loose bouldery sandy loam till.
60 to 180 inches, gray loose granitic till.

The entire profile is stony and medium to strongly acid (pl. 7, *A*). Because stoniness and the forest cover prevent effective separation, areas having textures other than stony fine sandy loam are included with this soil in mapping. Some ledge outcrops and small areas of soils with impaired drainage are also included.

Hermon stony fine sandy loam is now best used for production of timber. The soil is potentially arable and if cleared of forest and stones it should be similar to Hermon fine sandy loam, sloping phase, in productivity.

Hermon stony fine sandy loam, undulating phase (3–8% slopes) (HN).—This soil is similar to Hermon stony fine sandy loam in most characteristics other than slope. It occurs mainly on undulating to gently sloping tops of ridges and mountains.

Stoniness is the dominant characteristic of this phase, but the stones are rarely more than 20 inches in diameter. The profile is like the one described for Hermon stony fine sandy loam, but the organic deposit on the surface of this soil is usually deeper, and the gray layer is ordinarily more uniform in thickness and occurs less in pockets and more frequently in a band about 3 inches thick. The soil includes a more pronounced range of texture than Hermon stony fine sandy loam. Included in the rather broad range are loam, coarse sandy loam, and a few spots of loamy sand adjacent to soils developed on outwash.

The fertility and moisture conditions of Hermon stony fine sandy loam, undulating phase, permit production of good to fair stands of timber. The stones are not large enough to interfere with tree growth or forestry practices. The soil is covered with spruce, fir, maple, birch, beech, and other northern hardwoods. Ordinarily the timber is readily accessible for lumbering.

Timber production is now the best use for this soil. Many areas once farmed have reverted to forest, which indicates that farming may not have been profitable. A very few areas are still used for cultivated crops or pasture. Pasturing is common on recently cleared and recent slash areas.

Hermon very stony fine sandy loam (10–45% slopes) (Ho).—In essential characteristics this soil is similar to Hermon stony fine sandy loam but it usually has steeper slopes and is excessively stony. There are a great many boulders 2 to 10 feet or more in diameter.

The small to large irregular bodies of this soil occupy somewhat rough or broken sides of mountains and glacial till ridges, where they are associated with the Canaan and other stony soils. The areas are usually limited to the northeastern part of the county around Mount

Waldo. Considerable stream dissection occurs, and in a few instances, as in the vicinity of Frankfort near Mount Waldo, deep ravines have formed along entrenched waterways.

Included in mapping are a few small excessively stony areas having slopes of 10 to 20 percent that usually occur in pastures or are surrounded by cultivated areas of other soils. Because this phase has a wide slope range and rough or broken topography, rock outcrops and small areas of soils with impaired drainage were also included with it.

Practically all of Hermon very stony fine sandy loam is forested with mixed northeastern hardwoods and pine. Good timber is produced, though the stoniness and steepness of the soil interfere somewhat with forest growth and harvesting. The soil is considered nonarable and should not be cleared for cultivated crops. It is best used for timber production and recreational purposes.

HINSDALE SERIES

Soils of the Hinsdale series are developed entirely from a peculiar kind of black granite known as syenite and occupy a small area near South Liberty on State road No. 220 near the county line. Syenite has feldspar instead of quartz as its main mineral constituent, and the Hinsdale soils developed from it have rock fragments throughout because the feldspar weathers readily. The weathered rock material is often 2 or 3 feet thick, and particles of rock less weathered occur throughout the soil from the surface to the unweathered bedrock.

Hinsdale soils are gritty and gravelly because of the syenite fragments in their profile, and stones from locally glaciated ledges of other material may cover the surface of wooded areas or be piled in fence rows around cultivated fields. Hinsdale soils usually occur on variable relief but in this county they occupy extremely dissected and rounded deeply trenched knolls. The Hinsdale series includes Hinsdale gravelly sandy loam, rolling phase, and Hinsdale stony sandy loam and its hilly phase.

Hinsdale gravelly sandy loam, rolling phase (8–16% slopes) (HR).—This soil developed from residual syenite, fragments of which occur throughout the profile. The areas are small and irregular and occur in one locality near South Liberty.

The following describes a profile in a cultivated field:

0 to 5 inches, brown loose gravelly sandy loam; strongly acid.
5 to 15 inches, yellowish-brown slightly firm gravelly sandy loam; strongly acid.
15 to 30 inches, pale yellowish-brown loose gravelly sandy loam; strongly acid.
30 to 50 inches, brownish partly weathered dark granite, or syenite; moderately acid.
50 inches +, hard syenite.

The entire profile above bedrock contains quantities of coarse grains of syenite. Included in mapping are a few eroded, imperfectly drained, and poorly drained spots. They are indicated by symbols where they interfere with tillage. Ledges and rocks normally occur and are indicated by symbol where they interfere with cultivation.

Approximately 60 percent of Hinsdale gravelly sandy loam, rolling phase, is cultivated, usually to corn, peas, beans, potatoes, and apples. Pasture and hay do not thrive. Yields are low.

Hinsdale stony sandy loam (5–16% slopes) (Hs).—This soil occurs exclusively near the county line in the vicinity of South Liberty. It is developed from a thin till of mixed materials and partially weathered syenite derived from underlying ledges. The areas are usually fairly uniform in size and produce a landscape of pronounced glacially rounded knolls. Though this soil is usually associated with those derived from granite, as the Hermon, Canaan, and Acton, it occurs in this county with Hollis, Westford, Charlton, and Sutton soils developed from schistose materials.

The following describes a profile representative of the deeper pockets of soil material:

0 to 2 inches, dark-brown fairly loose light sandy loam; strongly acid.
2 to 5 inches, yellowish-gray loose sandy loam to loamy sand; strongly acid.
5 to 10 inches, strong yellowish-brown slightly firm but friable sandy loam; strongly acid.
10 to 16 inches, light yellowish-brown loose sandy loam; medium acid.
16 to 24 inches, partly rotted syenite and brown soil material.
24 inches +, syenite.

Boulders of partly weathered syenite occur throughout the entire profile. Irregular drainage is characteristic of much of the Hinsdale series in this county, and this soil includes the wet spots and marshy areas that commonly occur in depressions between the knolls.

Most of the soil is wooded, and there are some good growths of white pine, hemlock, spruce, and oak. The timber grows rapidly and reforestation is not difficult if seed trees and some young growth are left. A few areas are in brushy pasture or idle fields that afford very poor grazing. In spite of the generally choppy relief, timber can be removed without too much difficulty.

Hinsdale stony sandy loam, hilly phase (16–30% slopes) (Ht).—Small irregular bodies of this phase appear in a restricted area near South Liberty. The soil has developed from thin, mixed, well-drained stony till that includes a pronounced quantity of syenite from underlying ledges. It is associated with the same soils as other members of the Hinsdale series but is much shallower. For example, the usual depth for Hinsdale stony sandy loam is about 20 inches to the ledges, but the average for this soil is rarely deeper than 12 inches. Surface stones, boulders, and rounded ledges are also more prominent, but the sequence of horizons is much like that of Hinsdale stony sandy loam.

Poorly drained spots and marshy areas commonly occur in depressions between the glaciated knolls and are therefore considered characteristic of this phase. Because of the prominent ledges and stones, the soil is unsuited for anything except timber production. Timber growth is moderately good, but the hilly terrain may make harvesting of trees difficult.

HOLLIS SERIES

Soils of the Hollis series are developed on well-drained thin glacial till derived from pyritiferous schist, fine micaceous gneiss, and schist that weathers to a brown or olive mass of angular splintery soil material (pl. 7, *B*). The soils are mainly on the high flanks and tops of mountains or hills; along the backs of narrow ridges; and in valleys where areas of schist and fine micaceous gneiss are exposed. Relief ranges from nearly level to precipitous or steep. The microrelief is rough because many ledges are exposed over most of the area.

Hollis soils are usually associated with the Paxton, Charlton, Sutton, and Whitman, but in this county they also occur with the Westford and Thorndike. The Hollis is not a uniform series in this county, because the member soils contain many variegated strips of schist or coarse micaceous gneiss.

Hollis loam and Hollis gravelly loam, with the phases of each type, are the soils of the series that are most often cultivated. They occur mostly in the northeastern and central parts of the county, and are developed on moderately deep 30- to 40-inch till in which there is enough schist and pyritiferous and ferromagnesium minerals to make profiles somewhat similar. Hollis stony loam in the southern, western, and central parts of the county has developed on very shallow till of distinctly different characteristics. The ledge rocks of schist under the cultivated Hollis soils are highly pyritiferous and weather to a considerable depth. In contrast, the hard ledges of glacier-smoothed schist or micaceous fine gneiss under Hollis stony loam contain little of the more easily weathered pyritiferous material.

The Hollis series is represented by Hollis loam and its sloping, eroded sloping, steep, and eroded steep phases; by Hollis gravelly loam and its sloping phase; and by Hollis stony loam.

Hollis gravelly loam (0–8% slopes) (Hu).—This well to excessively drained soil occurs high on the flanks of mountains and ledgeland hills and in valleys near the confluence of glacial drainageways. It contains a noticeable quantity of subangular flat and somewhat rounded schistose gravel and has developed on a thin deposit of glacial till that is somewhat influenced by the underlying schist ledges. The soil occurs along the eastern border and in the central part of the county. It is associated primarily with the Etna and Stetson soils developed on outwash, and the Westford and Charlton soils formed on shallow and deep schistose till. In profile this soil is like Hollis loam except for the schistose and gneissic gravel.

The following describes a representative profile:

0 to 5 inches, light-brown gravelly loam; mellow soft crumb structure.
5 to 15 inches, yellowish-brown fine and friable gravelly loam.
15 to 30 inches, olive gravelly loam, only slightly firm.
30 to 48 inches, shattered ledgy schist and glacial till.
48 inches +, bedrock of schist.

The entire profile is very strongly acid. The gravel consists of fragments of schist and rounded quartzite. In places the gravel, the sand, and the thickness of the deposits vary somewhat, and there are some stones and ledges on the soil. Included in mapping and designated by symbols are eroded areas in cultivated fields and some cattail marshes.

Approximately 70 percent of Hollis gravelly loam is cultivated; the rest is about equally in orchards and pastures. In places the gravel makes seeding difficult, though other tillage operations are not particularly affected. Crop yields are low but can be improved by good management. Small fruits seem to do better than any other crop because the soil tends to be droughty. Potatoes, corn, oats, beans, and some hay are grown. Most pastures are unimproved and receive no fertilizer.

Hollis gravelly loam, sloping phase (8–16% slopes) (Hv).—Although similar to Hollis gravelly loam in many respects, this soil

occupies steeper relief. It occurs on rolling shallow kamelike areas in valleys near streams and on sloping sides of mountains or ridges in the eastern and central parts of the county. The soil has a profile like the one described for Hollis gravelly loam, but the solum is ordinarily thinner. In a few areas where this soil is adjacent to the Stetson soils, the solum may be more than 40 inches deep. Hollis gravelly loam, sloping phase, is associated with the Charlton and Westford, in addition to the Stetson soils.

The Hollis soil is usually stone-cleared and was at one time cultivated. Most of it is now in brushy pasture, hay, or cleared pasture, even though grass does not grow well. Many of the abandoned fields are growing up to aspen, maple, birch, and some jack and pitch pines. About 20 percent of the soil may still be cultivated, although this is not recommended. Canning corn, peas, and some beans and potatoes can be grown, but yields are usually low—a little lower than on Hollis gravelly loam.

Hollis loam (0–8% slopes) (Hw).—This soil occupies gently undulating to slightly rolling areas on the somewhat flat tops of hills and mountains. It does not cover a large acreage, and the individual bodies are small and irregular. Good examples of this soil are in the northeastern part of the county near the Waldo-Hancock Toll Bridge.

Rock outcrops and stones occur sparingly, but in nearly all the areas the ledges are at or just below the surface. In most places the soil is about 20 inches deep; but it may be as shallow as 8 inches or as deep as 40, the depth varying with distance from the ledges. The ledges and outcrop may be smooth and rounded, though they are usually laminated, angular, and broken into small fragments to a depth of a foot or more.

This phase is associated mainly with the Paxton and Charlton soils on well-drained deep till, the Sutton on imperfectly drained till, and the Whitman on poorly drained till. It is also associated with the shallow Westford and Hinsdale soils in the southern part of the county.

The following is a representative profile:

0 to 5 inches, brown to light-brown mellow loam of weak crumb structure.
5 to 7 inches, strong yellowish-brown mellow loam of weak crumb structure.
7 to 20 inches, light yellowish-brown firm but friable loam.
20 to 32 inches, olive to yellowish-brown, light loam, only slightly firm in places.
32 to 48 inches, shattered or slightly weathered ledges of schist.
48 inches +, bedrock of schist.

The entire soil is very strongly acid. Profiles may vary in depth from the one just described, but there is little range in color or texture. Included with this soil are eroded areas and some having imperfect or poor drainage. Erosion or eroded areas are not pronounced, however, because the slopes are moderate.

Most of Hollis loam is cultivated to truck crops, potatoes, and small fruits. The fields are small because they must be laid out between the ledges, and emphasis is therefore placed on small-unit farming. A poultry-vegetable type of farming is followed, or the raising of goats is combined with the production of small fruits or truck crops.

The range in yields is greater on this soil than on any other in the county because so much of it varies in depth. The soil may be extremely shallow, or in some places next to the Charlton or Paxton

A, View of Etna loamy sand, hilly phase, showing sand ridges.
B, View of Hartland silt loam showing degree of geologic dissection and the generally rolling clay deposit against mountain in background.

A, Granitic boulder on Hermon fine sandy loam.
B, Whitman-Acton-Hermon soils panorama near Swan Lake, Maine.

A, Hermon stony fine sandy loam, showing angular bouldery t
B, Hollis stony loam, showing shattery condition of schist be

A, Paxton loam, sloping phase, and characteristic glacial lake of
B, Undulating slopes of Suffield silt loam.

soils, rather deep. Yields for vegetables, canning corn, peas, small fruits, and other crops are moderately high if fertilizer and lime are properly applied.

Hollis loam, sloping phase (8–16% slopes) (Hz).—Although similar to Hollis loam in many respects, this soil is generally more rolling and sloping. It also has a few more ledge outcrops and is consequently shallower. The usual depth to bedrock is 12 to 15 inches. This soil is associated with the same soils as Hollis loam and occurs in small irregular areas over most of the county.

Only about 30 percent of this phase is cultivated to garden crops and berries; the rest is in pastures, orchards, or hay. Yields are somewhat low because of the general thinness of the soil and presence of ledges.

Where cultivated this soil is more eroded than Hollis loam. It is, however, predominantly in pasture, sodded orchards, and hay. Orchards on this soil are actually more affected by the shallowness of the soil over ledges than by erosion. This disadvantage is offset by better air drainage on the sloping land and an almost total absence of imperfectly or poorly drained spots. Apple yields are therefore as high or higher than on Hollis loam.

Hollis loam, eroded sloping phase (8–16% slopes) (Hx).—This soil is well drained. The generally small and elliptical areas are in all parts of the county where cultivated land is developed from shallow schistose materials. The soil is associated primarily with Westford and Charlton but occurs also with imperfectly drained Sutton soils.

The profile resembles that of Hollis loam, but surface layers are much thinner or absent because of accelerated erosion. Erosion has removed the dark-brown surface layer in many places, and as a result the soil is yellowish brown or strong brown and yellow at the surface. These light-colored spots are more prominent where erosion is most active, as in fields at the crests of hills and around ledges. Isolated areas of the eroded steep phase of Hollis loam having a quantity of angular schistic gravel in the soil and on the surface are included with this soil and indicated by map symbol.

Hollis loam, eroded sloping phase, is cultivated to corn, peas, beans, some potatoes, and small fruits. Yields are only moderately high and tend to become poorer unless suitable conservation practices are adopted. Contour tillage and terracing are not practical because of the numerous ledges, and it is therefore necessary to maintain the soil by using long rotations or by keeping it in grass.

Hollis loam, steep phase (20–30% slopes) (H2).—This soil is similar to Hollis loam in most characteristics but it occurs on the steepest part of stone-cleared areas. There are also a few more ledge exposures, and consequently this soil is thinner. The average depth may be only 10 or 12 inches. Textures also vary more than in Hollis loam because small areas of fine and sandy loams are included. Such textures occur more often along steep flanks of ridges than they do on the tops of ridges where Hollis loam predominates. Also included and shown by appropriate symbol on the map are areas containing a considerable quantity of angular flat-sided schistic gravel.

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Approximately 60 percent of Hollis loam, steep phase, is in grass or hay, blueberries, or sodded orchards. The rest is frequently timbered, especially where old fields have been abandoned, or where the glacial till is not excessively stony. Air drainage on this soil is better than on the sloping phase of Hollis loam, and orchard yields are consequently about the same. Yields of most crops are ordinarily a little lower, however, mostly because the surface layers are thin and tend to erode rapidly. Cultivation of this soil is not recommended.

Hollis loam, eroded steep phase (20–30% slopes) (Hʏ).—The areas of this soil are rather small and narrow and are scattered over the county in association with Westford and Charlton soils. They occupy only actively cultivated areas. The schist and fine micaceous gneiss ledges from which the soil developed are a little more prominent and numerous than in other cultivated Hollis soils. The soil is light-colored and shallow in most places, usually less than 12 inches deep, but otherwise it is much like Hollis loam. Some very gravelly areas are included. The gravel is usually composed of flat-sided slivers of schist or gneiss about 2 to 4 inches long, 1 or 2 inches wide, and about 1½ inches thick. The phase has very low crop yields and should be maintained in grass or timber.

Hollis stony loam (0–16% slopes) (H3).—Most of this well-drained soil is in the north-central and eastern parts of the county. It occurs on the tops and sides of ledgy ridges and mountains and in the more rolling valley areas where dissection has exposed many ledges. It is associated with Thorndike and Westford soils formed on shallow till and with the Charlton on deep till.

The stoniness of this soil results largely from exposed ledges rather than from the occurrence of the large surface boulders and erratics so common on stony soils developed from granite. The schist and fine gneiss rock of this soil has been broken into smaller flatter fragments than the granite of other stony soils. The ledges exposed, as for example at Waldo-Hancock Toll Bridge, are not over 10 feet high, and general relief is comparatively smooth.

The following is a representative profile:

0 to 2 inches, dark-brown to almost black partly decomposed organic matter; very strongly acid.
2 to 3 inches, light-gray loam to fine sandy loam, friable with little or no cohesion; very strongly acid.
3 to 5 inches, brown to dark-brown mellow loam of soft crumb structure; very strongly acid.
5 to 12 inches, yellowish-brown firm but friable loam; very strongly acid.
12 to 20 inches, yellowish-brown, green-tinged slightly firm loam to fine sandy loam; very strongly acid.
20 to 40 inches, shattered partly weathered schist; very strongly acid.
40 inches +, hard schist bedrock.

The entire profile above bedrock contains fragments, angular and subangular boulders, and slabs of schist.

Hollis stony loam is for the most part wooded. Some of it is in brushy pasture on blueberry fields, or is abandoned land grown over mainly with ground hemlock. The wooded areas are covered with poor stands of pine, dwarf hemlock, spruce, some oak, aspen, yellow and gray birches, and maple. Most of the timber is cut for pulpwood or cordwood because reforestation is so slow. Stands seldom reach saw-timber size after the original forest is removed. Faulty lumbering and fire are in large measure responsible for the poor timber.

This is evident on comparing reforested land with a few original stands of oak, ash, maple, birch, and beech, mixed with spruce and fir, that remain on some deeper areas of this soil.

LITTLEFIELD SERIES

Soil of the Littlefield series has developed on saturated deposits of partially decayed sedges and rushes. It occurs in old lake beds in all parts of the county, around present lakes in remnantal glacial waterways, and in depressions. Littlefield soil is closely associated with Scarboro fine sandy loam, Waterboro muck, Balch peat, and Greenwood peat. It differs from Scarboro fine sandy loam in having organic instead of mineral material in its profile; from Waterboro muck in the extent to which the organic material is decomposed; from Balch peat in containing sedge and other finely fibrous plant material; and from Greenwood peat in lacking sphagnum moss in its profile. Littlefield peat is the only member of the series mapped in this county.

Littlefield peat (0–2% slopes) (La).—This saturated bog soil has developed from partially decayed sedges, rushes, heath plants, and other herbaceous material. It supports little timber and the surface is frequently saturated. Samples of this soil indicate that it has not advanced far from the permanently ponded stage, and for the most part small shallow ponds still exist in the centers of the deposits. Of the two samples taken, one supported only heath plants (*Ericacea*) or bracken ferns, sedges, rushes, tall grass, and some sphagnum moss; the other had largely heath, and a scattering of poplar, maple, spruce, larch, and hemlock around its margins.

The following profile in a semiwooded bog is representative of most of Littlefield peat:

0 to 8 inches, black crumb structured saturated muck; very strongly acid.
8 to 72 inches, alternating layers of fine and coarsely fibrous brown saturated sedge or herbaceous and woody peat; extremely acid.
72 to 120 inches, finely fibrous dark-brown saturated sedge, rush, and herbaceous peat; extremely acid.
120 to 180 inches, slightly compact sedimentary and very finely fibrous dark-brown saturated sedge-and-rush or grass peat; very strongly acid.
180 inches +, compact sedimentary brown sedge-and-rush peat resting on silt; strongly acid.

Littlefield peat does not contain so much coarse and woody material as Balch peat, and the fire hazard is therefore less. Nonetheless, the draining of any peat bog is undesirable unless the peat is to be used for a specific purpose. Some pulpwood or cordwood can be cut from bogs of Littlefield peat, although the yields are low. A few areas have been used for cranberries, but most of this soil is wasteland.

MELROSE SERIES

Soils of the Melrose series occupy narrow, more or less regular bands and tracts bordering sandy plains and marine-clay areas and are scattered throughout the eastern, western, and central parts of the county. In many respects Melrose soils are similar to those of the Adams series, but they developed on sandy outwash or sandy marine terraces and are 30 to 48 inches deep to the clay substratum. Adams soils, in contrast, are 48 inches or more deep to the clay.

Melrose soils are nearly level to undulating, and like the Adams, do not have gravel or any very coarse material in their underlying deposits of quartz, gneiss, and some schist sand. They are rather yel-

low or brown and are somewhat podzolized, or leached. There is a distinct ashy gray layer 2 to 3 inches thick in wooded areas.

Because of favorable relief and good internal drainage, Melrose soils are ordinarily not subject to erosion. Nonetheless, erosion may be somewhat active in small areas where drainage channels have started to cut into the clay substratum. The Melrose series is represented only by Melrose fine sandy loam and its undulating phase. Nevertheless, some of the best farm land in the county is on these two soils.

Melrose fine sandy loam (0–3% slopes) (MA).—The rather long usually narrow and regular tracts of this soil are along streams in the central and western parts of the county. Relief is nearly level. The soil developed from mixed sands 30 to 40 inches deep over marine or lacustrine (lake-laid) silt or clay. It is associated with the similarly derived Adams soils; with Stetson soils formed on well-drained outwash; and with the imperfectly drained Sudbury soils. Included with this Melrose soil and indicated by map symbols are imperfectly drained spots.

Melrose fine sandy loam varies in depth to clay but the following profile is representative:

0 to 10 inches, brown mellow fine sandy loam of weak crumb structure; strongly acid.
10 to 24 inches, yellowish-brown loamy fine sand; slightly firm in places; strongly acid.
24 to 38 inches, light yellowish-bronze loose loamy fine sand; strongly acid.
38 to 56 inches, slightly compact gray very fine sandy clay; strongly acid.
56 inches +, gray to dark-gray very fine sandy clay, silty clay, or clay; material is fairly compact, and brittle or plastic according to moisture conditions; slightly acid.

Melrose fine sandy loam is entirely cleared. Corn, beans, peas, truck crops, berries, potatoes, ornamentals, and pasture and hay are grown. Yields are rather high under good management. Though the soil is itself well drained, apples and other fruit trees may winterkill because air drainage is lacking. Also, the sandy soil in a few areas is so thin over the clay as to be unfavorable for fruit trees. A few areas in Winterport town (township) are more rolling than normal, have better air drainage as a result, and support fruit trees fairly well.

Melrose fine sandy loam, undulating phase (3–8% slopes) (MB).—Although this soil is associated with the same soils as Melrose fine sandy loam and occurs in the same parts of the county, it usually has deeper sandy material and, in addition, occupies slopes near steeper and more rolling areas such as terrace escarpments or upland. Otherwise this soil and Melrose fine sandy loam are similar. Gravel, stones, and ledges are not ordinarily present in this phase. A few areas where they do occur, as well as a few marshy tracts of less than 3 acres, are shown on the map by symbols. There are a few moderately eroded patches in cultivated fields.

Some fields are in brushy pasture, but nearly 80 percent of Melrose fine sandy loam, undulating phase, is cultivated, or in the rotated and improved pastures for which the soil is well suited. The yields are good, though lime, manure, and complete fertilizer are needed for best results.

ONDAWA SERIES

The soil of the Ondawa series is on nearly level to undulating sandy well-drained second bottoms rarely flooded and on first bottoms occasionally flooded. Floodwaters usually recede before the crop season.

Ondawa soil may sometimes contain gravel at a depth of 3 feet. Otherwise its profile is free of stones, ledges, or gravel. There are no imperfectly or poorly drained spots, but the soil may be slightly droughty during dry spells because of somewhat excessive internal drainage. Ondawa fine sandy loam is the only member of the series in this county.

Ondawa fine sandy loam (0–3% slopes) (OA).—This soil occurs mainly on nearly level to gently undulating sandy well-drained stream bottoms that flood once in 8 or 9 years. The areas are usually narrow and winding and occur in only a few places, as along the Sebasticook River. The total acreage is small because river and stream valleys in this county are narrow. The soil is entirely free of stones and ledges, but in places some gravel from nearby terraces is deposited on the surface. In some instances a gravelly substratum may occur at a depth of 3 feet, but the profile is usually sandy throughout. This soil is associated with the well-drained Stetson and Melrose soils, the imperfectly drained Sudbury and Podunk soils, the poorly drained Rumney loam, and Alluvial soils, undifferentiated.

The following describes a representative profile of Ondawa fine sandy loam:

0 to 10 inches, brown to dark-brown mellow fine sandy loam of soft crumb structure; medium acid.
10 to 15 inches, brownish-yellow firm but friable fine sandy loam to loamy fine sand; medium acid.
15 to 28 inches, pale brownish-yellow loose loamy sand; medium acid.
28 to 44 inches, pale yellowish-gray slightly compact fine sand; medium acid.
44 inches +, gray to grayish-yellow sand or coarse sand with some strata of gravel and in places lenses of silt; medium acid.

Ondawa fine sandy loam is the most productive soil in the county for general crops and is used almost entirely for general farming. It produces rather high yields of all crops except potatoes and apples. It is a little too droughty for potatoes and is too low to provide the air drainage necessary for apple orchards. A few areas near hills may have sufficient air drainage, and on these apples might do well.

Because of its sandy texture and rather excessive internal drainage, this soil requires rather frequent additions of stable or green manure. Lime and fertilizer are also needed for satisfactory yields.

PAXTON SERIES

Soils of the Paxton series have developed on very compact to relatively hard platy deep gneissic till and usually occur rather high on rolling to steeply sloping ridges and valley walls. They are associated most frequently with the imperfectly drained Sutton, the poorly drained Whitman, and the well-drained Charlton soils; but in some instances are adjacent to Hermon and Etna soils and areas of the Bangor-Hartland complex. Because of their compact subsoil, Paxton soils are subject to more seepage than other well-drained soils.

Paxton soils produce fairly high yields of cultivated crops and hay. Apple and other fruit trees give low yields because the compact subsoil somewhat retards internal drainage. In part because of the compact subsoil, some members of the Paxton series are susceptible to accelerated erosion in cultivated areas. Ordinary cropping practices and perhaps contour tillage will control erosion on Paxton soil with slopes of less than 8 percent. Management of that on slopes of 8 to 15 percent should include some other simple conservation practices. On slopes of more than 15 percent, complex erosion control practices may be necessary. Paxton soil on slopes exceeding 25 percent is usually not tilled and would be subject to severe erosion if it were. The series is represented by Paxton loam and its sloping, eroded sloping, steep, and eroded steep phases; and by Paxton stony loam and its undulating and steep phases.

Paxton loam (0–8% slope) (PA).—This is a deep mellow moderately well-drained soil. It developed on deep compact till composed of gneissic and schistose materials. The relatively small banded areas occur on nearly level to undulating or gently sloping tops and sides of rounded ridges. Though this soil is normally associated with those of the Charlton and Bangor series, which are derived from similar deep till, it frequently adjoins shallow soils such as the Westford and Hollis. Where it occurs with shallow soils its parent material apparently has been shoved against ledge hills or mountains by glacial action. Areas of this soil are distributed in the southeastern and central parts of the county near Lincolnville Center and Morrill, respectively.

The profile characteristics of this soil, as observed in a cultivated area, are described in the following:

0 to 6 inches, dark-brown very friable loam of weak crumb structure.
6 to 12 inches, brown gravelly loam; very friable.
12 to 18 inches, yellowish-brown firm but friable gravelly loam.
18 to 24 inches, light yellowish-brown compact sandy loam.
14 inches +, yellowish-gray to olive compact hard platy-structured gravelly loam till; contains some partly rounded boulders.

The entire profile is acid. Only small quantities of gravel and small stones occur. The relatively compact subsoil causes some lateral seepage, and as a result there are many imperfectly drained spots or small areas.

Potatoes, corn, beans, oats, timothy and clover hay, other hay, small fruits, and vegetables are produced on Paxton loam. The yields for potatoes and beans are somewhat variable, but they are uniformly high for oats, corn, and hay. Orchards are not usually very successful. Young orchard trees make a good start, but the roots fail to penetrate the hard and compact subsoil, and when the trees become older they winterkill or die in summer from lack of moisture and nutrients. Small fruits and truck crops give high yields when complete fertilizer, lime, and manure, are used in adequate amounts.

Erosion usually is slight on cultivated areas of Paxton loam. Some rill erosion has occurred on slopes near 8 percent, particularly where potatoes or other row crops have been planted with rows extending up and down the slope.

Paxton loam, sloping phase (8–16% slopes) (PD).—This soil is similar to Paxton loam in profile characteristics but its surface soil

may be somewhat thinner and the compact layer of its subsoil is nearer the surface. Also, a few more stones and gravel may be exposed. Slopes range from 8 to 16 percent (pl. 8, *A*), as compared to a maximum of 8 percent for Paxton loam. The irregular narrow bodies of this soil occur along the sides of ridges, valley walls, and mountains in the central-southern part of the county, and are associated with Charlton, Hollis, and Sutton soils.

All of Paxton loam, sloping phase, is tillable; most of it is in permanent pasture, orchards, and meadows. About 40 percent of the land is in cultivated crops. Yields are a little lower than on Paxton loam. Orchards do somewhat better on this soil than on Paxton loam because of better air drainage, but none of the Paxton soils are so well suited to orchards as those of the county having permeable subsoil.

Cultivated areas of this phase are somewhat susceptible to erosion. Under present usage, however, this is not a serious problem. Contour tillage and long rotations are usually the only practices necessary for adequate control of water and erosion on that part of the sloping phase now cultivated. Fertilizer treatments are similar to those for Paxton loam.

Paxton loam, eroded sloping phase (8–16% slopes) (PB).—This soil is similar to Paxton loam in general profile characteristics but occupies steeper slopes and has been subjected to erosion. It also has more gravel and stones on the surface and may include occasional ledge outcrops and patches shallow to bedrock. The small irregular bodies of this phase are associated with the same soils as Paxton loam and are distributed in the same parts of the county. In most instances only a fraction of the surface soil remains on this phase, and in places much or all of the subsoil and even some of the parent material have been removed by erosion. Removal of soil layers has not been uniform. This is indicated by the presence of many light-colored elliptical eroded spots where the subsoil or parent material is exposed. There are also variable numbers of very small gullies caused by rill action. Material removed from the gullies is deposited as local alluvium at the bases of slopes.

Included with this phase are patches having excessive or severe sheet or gully erosion, small stony and gravelly areas, and some definite seepage spots, all of which are indicated by appropriate symbols on the map.

About 80 percent of Paxton loam, eroded sloping phase, is cultivated; the rest is pastured or in orchards. About the same crops are grown as on the Paxton loam, though yields are lower and not uniform. The crops are spotty according to the erosion pattern of the soil. Erosion can be controlled by simple and complex practices, including contour strip cropping and use of long rotations.

Paxton loam, steep phase (20–30% slopes) (PE).—Although similar to Paxton loam in essential profile characteristics, this soil has thinner and darker surface and subsoil layers, steeper slopes, and greater susceptibility to severe erosion under cultivation. The soil layers are darker than those of Paxton loam because they are subject to more seepage. There are a few stones on the surface and some ledge outcrops in areas adjacent to Hollis and other shallow soils.

The small narrow irregular bodies of this phase are associated with the same soils as Paxton loam and are distributed in the same parts of

the county. Included with this soil in mapping and indicated by appropriate symbols are ledge outcrops and seepage spots that interfere with use and management.

Over 75 percent of Paxton loam, steep phase, is in permanent pastures, meadows, or sodded orchards. Erosion is not a problem where the land is put to such uses. Cultivated areas require diversion ditches, long rotations, and contour strip cropping to control erosion. Where erosion is active, yields decrease rapidly. Yields are less than on Paxton loam.

Paxton loam, eroded steep phase (20–30% slopes) (Pc).—In essential characteristics, including the nature of the lower profile, stoniness, and slope, this soil is similar to the steep phase of Paxton loam. It differs in the upper part of the profile because of intensive cultivation and consequent erosion. The surface layers have been truncated to varying but marked degree and in some instances entirely removed. The phase occurs chiefly on the steeper slopes of cultivated fields and is associated with Charlton, Colrain, Hollis, and Sutton soils. The small irregular bodies are distributed in the south-central and eastern parts of the county.

About 70 percent of this soil is cultivated. Potatoes, beans, and corn are the chief crops. The same conservation measures are needed to control erosion as on the steep phase. Liberal applications of lime, commercial fertilizers, and manure are necessary to maintain yields.

Paxton stony loam (8–16% slopes) (Pf).—This is well drained to moderately well drained strongly acid soil. It has developed on deep compact gritty gneissic and schistic till in which there are rounded stones and boulders. The combined depth of soil and underlying till to the rock, gravel, or clay formation is usually more than 30 feet. Large irregular bodies of this somewhat extensive soil occur in association with Charlton, Sutton, and Hollis soils on the rolling stony parts of the hills around Levenseller Mountain and in other places in the central part of the county.

A few ledge outcrops occur where this soil adjoins shallow or ledgy soils, and there are some moderately stony areas where fragments of gneiss and schist are thinly scattered. In other places there are occasional boulders 3 to 4 feet in diameter. Some seepage is normal to all Paxton soils because of their compact subsoil, and the many small poorly drained spots occurring in this phase are characteristic. Small marshy spots grown over with cattails or sedges are usually indicated by map symbol.

The profile of Paxton stony loam is darker than that of any other soil in the well-drained upland group. The following describes a profile in a forested area:

0 to 2 inches, dark-brown to blackish-brown partly disintegrated organic matter; strongly acid.
2 to 3 inches, gray loam of single grain structure; strongly acid.
3 to 5 inches, brown very friable loam; strongly acid.
5 to 12 inches, yellowish-brown firm but friable loam to gravelly loam; acid.
12 to 22 inches, light yellowish-brown firm compact sandy loam; acid.
22 to 42 inches, olive compact hard platy-structured gravelly loam; acid.
42 inches +, olive compact gritty till containing rounded boulders; acid.

The entire profile contains stone. The subsoil is relatively uniform, particularly in hardness and compactness. Variations occur chiefly in texture of the surface soil and degree of stoniness.

Nearly all of Paxton stony loam is timbered with stands of northern hardwoods, spruce, and hemlock or fir. A few permanent pastures and orchards have been established on some of the less stony areas.

Paxton stony loam, undulating phase (3–8% slopes) (PH).—Surface layers are thicker and in some instances mucky near the top, but in essential profile characteristics this soil is similar to Paxton stony loam. The long narrow bodies of this phase occur mainly on the tops of ridges and mountains in the south-central part of the county, and are associated with the same soils as Paxton stony loam.

Nearly all of Paxton stony loam, undulating phase, supports good stands of northern hardwoods, spruce, and fir. Some areas are potentially arable. Some abandoned fields are found on this phase.

Paxton stony loam, steep phase (20–30% slopes) (PG).—Although this soil is similar to Paxton stony loam in essential profile characteristics, its surface soil is somewhat thinner and the organic layer at the top is thicker, particularly in the small depressed pockets common on the slopes. Large irregular bodies of this soil are associated with the same soils as Paxton stony loam and are distributed in the southern and central parts of the county.

This phase is characterized by a fairly uniform covering of gneiss and schist stones and boulders 24 inches or less in diameter. There are some ledges in areas transitional to shallower soils. Small stony patches of soil with seepage occur because of the hard compact Paxton subsoil. Small included marshy areas supporting a growth of cattails and sedges are indicated by symbols on the map.

Paxton stony loam, steep phase, is almost entirely forested, chiefly with stands of northeastern hardwoods, spruce, fir, and some white pine and hemlock. It is best used for timber because the relatively smooth relief makes lumbering relatively easy.

PODUNK SERIES

The soil of the Podunk series is imperfectly drained and occupies more or less gently undulating sandy first bottoms. It occurs in long narrow bands along streams and, though dry most of the year, is subject to frequent inundation. The occurrence of old imperfectly drained stream oxbows is one of the chief characteristics of the series. Frequently these limit the use of better land to brushy pasture or timber.

Little stone or gravel occurs in Podunk soil, but there may be an occasional rock outcrop. Podunk soil is often mixed with Ondawa soils on large stream bottoms, and may be associated with Rumney loam on old poorly drained stream meanders. Podunk fine sandy loam is the only member of the Podunk series mapped in this county.

Podunk fine sandy loam (0–3% slopes) (PK).—This is probably the most extensive bottomland soil in the county. It occurs in all stream bottoms on slightly undulating slopes. The large and small winding areas occur in association with bodies of poorly drained Rumney loam, well-drained Ondawa soils, and poorly or imperfectly drained Alluvial soils, undifferentiated. Representative areas are on the wide bottom lands of the Sebasticook River near Burnham.

Following is a profile description:

0 to 12 inches, dark-brown to dark grayish-brown fine sandy loam of weak crumb structure; moderately acid.

12 to 20 inches, dark-gray to gray fine sandy loam of slightly firm consistence and weak crumb structure; moderately acid.

20 to 36 inches, slightly compact saturated fine sand mottled with gray, yellow, and rusty brown; moderately acid.
36 to 48 inches, compact fine sandy loam to fine sand varied with silt; material is mottled gray and yellow; moderately acid.

The profile just described is representative of most areas, but textures of the surface layer may vary because small patches of loam, loamy fine sand, and sandy loam are included with Podunk fine sandy loam.

ROCK OUTCROP

Rock outcrop (0–100% slopes) (Ra) occurs around Bald Rock, Waldo, and Frye mountains and on other prominent mountains and hills. It is composed of rock cliffs 30 feet or more high, steep extremely rocky accumulations of mountain talus, and glacier-smoothed shields of bare rock on the tops of ridges. It occurs in two distinct topographic situations, one on the tops of glacier-smoothed ridges where slopes rarely exceed 15 percent, and the other in mountain areas where slopes are seldom less than 45 percent and range to perpendicular cliffs. For example, Maiden Cliff on the east shore of Megunticook Lake is nearly 800 feet high.

ROUGH STONY LAND (CANAAN SOIL MATERIAL)

Rough stony land (Canaan soil material) (30–50+% slopes) (Rb) generally occurs on the most rugged, dissected, and mountainous terrain. The areas, large and irregular, occur near Mount Waldo and South Liberty. Ledges, stones, and boulders of granite, coarse gneiss, pegmatite, and syenite are prominent, though this land type is less precipitous than Rock outcrop, with which it is closely associated. The little soil that does occur is similar in profile to stony Hinsdale or Canaan soils.

All of the land is timbered, but harvesting may be difficult because of stoniness. On the granitic rough stony ledge land grow aspen, red spruce, yellow birch, some oak and pitch pine, and scattered single trees of other species. Stands are rather poor. Harvesting such timber for other than pulpwood or cordwood is ordinarily not profitable. At one time, however, there was a scattered stand of fairly large trees. If enough seed trees and young growth had been left when this original stand was cut, timber instead of dwarf juniper probably would now be growing between the ledges.

ROUGH STONY LAND (PAXTON SOIL MATERIAL)

Rough stony land (Paxton soil material) (30–50+% slopes) (Rc) occurs on very steep, generally rugged, dissected areas. The areas are large and irregular on steep mountain flanks, sides of ridges, and occasionally on the steeply rolling morainelike valley ridges consisting of crevasse fillings. Bodies of this land type are distributed, for the most part, in the central and southern parts of the county and less generally on the northern border. The areas along the northern border are in fact inclusions of Rough stony land (Bangor soil material), Rough stony land (Charlton soil material), and Rough stony land (Colrain soil material). These were included because of their small individual and total extent.

The soil material of Rough stony land (Paxton soil material) is a deep excessive well-drained compact till similar to that on which Paxton soils have developed in areas of lesser grandient and dissection.

The till contains many huge boulders 2 to 10 feet or more in diameter, erratics, and clumps of stones.

This land type is apparently suitable only for forestry and recreation. Good stands of mixed northern hardwoods, spruce, fir, and pine or hemlock frequently occur, but lumbering may prove difficult, and special equipment may be required to remove the timber.

ROUGH STONY LAND (THORNDIKE SOIL MATERIAL)

Rough stony land (Thorndike soil material) (30–50+% slopes) (RD) is composed of very ledgy and extremely stony areas where ledges of schist, slate, phyllite, and micaceous gneiss occur. Long narrow bodies of this land are distributed throughout areas of Thorndike soils but do not cover a particularly large acreage.

Most of the land is steep and in many areas it is dissected and has deeply incised valleys along entrenching streams. There are a few pockets of soil material 10 to 12 inches deep that support sufficient timber to allow some cutting of pulpwood and cordwood, but harvesting is difficult on such steep slopes.

Dwarf juniper, white cedar (arborvitae), aspen, white pine, red spruce, and yellow birch are the trees most common on this soil. The stands are extremely thin, and the long exposures of nearly bare rock ledge prevent effective reforestation. In a few areas some blueberries have been produced.

ROUGH STONY LAND (WESTFORD SOIL MATERIAL)

Rough stony land (Westford soil material) (30–50+% slopes) (RE) occupies rough and mountainous tracts of schist, micaceous fine gneiss, and similar rock rather than areas of granite or limy ledges. It is probably the most extensive of the rough stony land types. The large irregular tracts occur around Bald Rock, Levenseller, and other mountains in the southern part of the county. Associated are other rough lands and the stony Charlton, Paxton, and Colrain soils. Included with this land type are small areas having Hollis and Westford schistose material and slopes of 30 to 50 percent or more. An area of this kind is near Waldo-Hancock Toll Bridge and another is close to Fort Knox.

The soil material of this land type occurs mainly between the ledges and boulders, and the profile is usually so thin that normal layers, or horizons, are difficult to distinguish. In general, however, profiles of this separation are related to those of stony Westford or Hollis soils. All of Rough stony land (Westford soil material) is timbered. It supports a thin stand of red spruce, pine, aspen, yellow birch, some ash, beech, and maple, and, in addition, the ever-prevalent dwarf juniper.

RUMNEY SERIES

The soil of the Rumney series occupies poorly drained, sometimes saturated, nearly level sandy first bottoms subject to frequent inundation. The intermixed soil materials are of schistose, phyllitic, and granitic origin. Frequently Rumney soil occurs along old stream meanders and in low places between knolls of Podunk or Ondawa soils. Representative areas are along the Sebasticook River and other rivers of the county. The areas are both large and small and wind with the old stream courses.

Nearly all large areas of Rumney soil are timbered, but there are a few small formerly cleared ones now grown up in chokecherry and alder. Larch, willow, alder, hemlock, fir, spruce, birch, elm, and maple grow on most of the timbered land. Water-soaked areas may support cattails and other hydrophytic plants. Rumney loam is the only member of the series occurring in the county.

Rumney loam (0–2% slopes) (Rr).—This poorly drained soil occurs in old stream meanders on the wide bottom lands of the Sebasticook and other rivers and is also represented in all narrow winding stream bottoms that are sandy and wet. Although the areas are usually narrow and winding, there are a few broad elliptical or irregular tracts of considerable size. This soil is associated with the Podunk and Ondawa and to a lesser extent with the Stetson and other soils occupying outwash or stream terraces. Rumney loam is much wetter and darker than Ondawa soils and differs from Podunk fine sandy loam in drainage and in degree of mottling in the lower part.

Following is a profile description:

0 to 10 inches, dark-brown to dark-gray loam of weak crumb structure; medium to strongly acid.
10 to 12 inches, brown to grayish-brown sandy loam; moderately to strongly acid.
12 to 20 inches, mottled gray, brown, and yellow saturated loamy sand; medium to strongly acid.
20 inches +, strongly mottled gray, brown, and yellow loamy sand varved with silt layers; medium to strongly acid.

The soil varies somewhat from the profile just described. It may have a black mucky surface soil 4 to 5 inches thick or a sandy light-colored one. The degree of wetness also varies, but the soil is usually dry on the surface except during spring or fall floods. Gravel occurs in a few places, usually in the lower part of the profile.

Rumney loam is never cultivated, is rarely in pasture, and is largely in timber of mixed ages and stands. Water-soaked areas may support only cattails and other hydrophytic plants, whereas other tracts have good stands of softwoods—larch, willow, alder, hemlock, spruce, birch, and elm. Some areas are entirely in alder, willow, and herbaceous plants; these are a source of the wattles used in building fish weirs.

SACO SERIES

Soils of the Saco series are slowly or poorly drained and uniformly compact and heavy-textured. They have developed entirely from silts and clays and are in this respect similar to the closely associated Biddeford, Buxton, Suffield, and Hartland soils. The areas are generally narrow and winding, though some broad elliptical ones occur along larger streams. The soils of this series occur along the North Branch Marsh Stream and along streams adjacent to the Penobscot River and Penobscot Bay in the northeastern part of the county.

Saco soils are slightly less well drained than the Buxton and differ from both the Buxton and Biddeford in position. They differ in drainage, position, and profile from the Suffield and Hartland soils. The Suffield and Hartland soils are very well drained and occupy terrace or upland positions, whereas the Saco soils are wet, have slopes of less than 3 percent, and occupy bottom land exclusively. The Saco series is represented in this county by only two types—Saco silt loam and Saco silty clay loam.

Saco silt loam (0–2% slopes) (Sa).—This type occurs more frequently along streams draining Melrose, Adams, sandy Suffield, and Hartland soils than along those draining the heavier textured soils of the Biddeford, Buxton, Suffield, and Hartland series. The soil therefore contains a considerable quantity of loamy and fine sandy material, as well as clay, and tends to be better drained than Saco silty clay loam. In some places it has a browner surface color than Saco silty clay loam.

Following is a representative profile observed south of Monroe toward West Winterport:

0 to 5 inches, very dark-brown and compact silt loam; material is difficult to displace because of a dense mat of roots near the surface, and its consistence is such that it is not easily pressed into compact plaques or short fragile ribbons between the thumb and fingers; medium acid.

5 to 10 inches, mottled brown and yellow or gray compact and sticky silty clay loam; material difficult to displace and is not easily pressed into short thin brittle ribbons between the thumb and fingers; dark-brown stains appear around some old root channels; slightly acid.

10 to 15 inches, extremely mottled gray and yellow very compact plastic silty clay; difficult to displace or press into long tough ribbons; slightly acid.

15 inches to undetermined depth, semisaturated and very compact plastic clay extremely mottled with dark gray and yellow; clay is difficult to displace and press into long thin ribbons; only a few whitish roots appear in this layer and the one above; material is neutral to slightly alkaline.

Almost all of Saco silt loam is in pasture and hay, particularly clover hay, because it is mildly acid. Hay may yield nearly 2 tons an acre with the addition of very little fertilizer except manure. Pastures on this soil are among the best in the county and easily support a cow an acre from May to October of each year. Top dressings of fertilizer would benefit the pastures. Groves of larch, spruce, fir, and hemlock furnish shade for cattle. Now and then there is a wooded area, but no extensive forest growth.

Saco silty clay loam (0–2% slopes) (Sb).—This soil occurs along the North Branch Marsh Stream and in the central-northeastern corner of the county near Winterport (township), where streams flow into marine estuaries. It also occurs along Toddy Pond and the brooks and streams draining several large clay basins in that vicinity. Except in the clay basins, the areas are generally narrow and winding. In clay basins the soil is associated with Biddeford soil, and the areas may be rather broad. It is associated also with Buxton and Rumney soils and with Alluvial soils, undifferentiated. This soil is similar to the Biddeford but is subject to overflow, whereas Biddeford and Buxton soils are not. From the Rumney it differs in having heavier textures, and from Alluvial soils, undifferentiated, in lacking sandy material. This soil and those with which it is associated, except the Buxton, are poorly drained. The Buxton has impaired drainage.

The profile is similar in most respects to the one described for Saco silt loam, except the surface soil is usually stiff, plastic, dark gray, and of very much heavier texture than that of Saco silt loam. For the most part the surface soil is clay. This soil is mottled almost to the surface and is frequently saturated, whereas Saco silt loam is often dry. The profile of this soil is more uniformly heavy and discolored than that of Saco silt loam.

Saco silty clay loam is semimarshy and is used exclusively for pasture and timber. The forest growth on less marshy areas is usually larch, spruce, hemlock, fir, and alder, with some willow, elm and other deciduous trees. Tall grasses, rushes, and sedges are on the saturated tracts near the marine estuaries. The inland areas of this soil are associated with the heavy Hartland, Suffield, Biddeford, and Buxton soils. In such places the soil is drier and may support good clover, timothy, and bluegrass pasture.

SCARBORO SERIES

The soil of the Scarboro series is poorly drained and resembles Rumney soil. It occurs on terrace land, however, and has developed from saturated to poorly drained sandy material of mixed origin. The areas are associated with those of imperfectly drained Sudbury fine sandy loam, of well-drained Melrose, Adams, and Stetson soils on the outwash terraces, and of Agawam loamy very fine sand on river terraces. Scarboro soil differs from all the associated soils except the Rumney in its poorly drained condition, and from the Rumney in not being subject to overflow. Most of the Scarboro soil is fairly uniform in texture, but it may range from loam to loamy fine sand. The general texture seems to be fine sandy loam. Rather large broad tracts and small scattered more or less regular areas of Scarboro soil occur in the western, central, and southern parts of the county, mostly on sandy delta or outwash plains. The series is represented only by Scarboro fine sandy loam.

Scarboro fine sandy loam (0–2% slopes) (Sc).—Fairly large tracts of this sandy soil occur on terraces of the county. The soil is associated with Agawam, Stetson, and Adams soils on sandy deposits and with the Melrose on marine terraces. It surrounds lakes, marshes, and bogs in the central, southern, and western parts of the county.

The soil is mottled from 10 inches to an unknown depth below the surface. It is saturated in places by a high water table for a large part of the year. Some areas are so wet during spring and so dry in fall that they have developed a vestigial dark-brown hardpan layer a few inches below the surface. In this respect the soil is somewhat like Ground-Water Podzols.

The following profile represents most of the medium-textured and semisaturated areas:

0 to 5 inches, very dark gray to almost black mucky fine sandy loam; strongly acid.

5 to 8 inches, light-gray loamy fine sand of single grain structure; strongly acid.

8 to 12 inches, mottled gray, yellow, and brown fine sandy loam to loamy sand, fairly firm in places; strongly acid.

12 to 24 inches, mottled gray and yellow sand to loamy sand, slightly less firm than the layer above; strongly acid.

24 to 52 inches, gray slightly compact sand; saturated; strongly acid.

52 inches +, gray sand, sandy clay, or clay.

There is usually no gravel or stone in the parent material, though some may occur in areas transitional from this soil to the Etna and other soils developed on coarse outwash or till. Textures do not vary much but may include some loamy fine sand and loamy sand.

Scarboro fine sandy loam is not subject to erosion and is generally covered with fir, spruce, hemlock, birch, larch, alder, and, in saturated

areas, hydrophytic plants. Exceptions are the few pastures and hayfields and one or two areas drained and used for cultivated crops. Strawberries and truck crops are best suited to the drained areas, though corn, potatoes, and field beans are sometimes grown. Timber production is by far the best use for this soil.

SHAPLEIGH SERIES

Soils of the Shapleigh series have developed on gneissic and granitic ledge land occurring on glaciated mountains, ridges, and hillsides where little till remains. They have also developed where extreme dissection has occurred on lowlands and along stream courses. All the Shapleigh soils are characterized by frequent outcroppings of ledge rock and they may occur as long thin fingerlike bodies at hill crests and on valley floors, or as irregular knobs and smooth nearly level exposures on hillsides. Between the ledge outcrops the till is sometimes 40 inches deep. Normally, however, the soil mantle and underlying till rarely exceed 36 inches, and the average range in depth to underlying bedrock is 15 to 20 inches.

Shapleigh soils are restricted to areas of ledge land composed largely of gneiss and pegmatite, a form of coarse granite markedly gneissoid that may have twisted and gnarled bands of micaceous gneiss along with large seams of quartz. Shapleigh soils are not extensive and occur chiefly in the central part of the county.

Associated with the Shapleigh soils are the Canaan, more acid and leached (podzolized), which occur on granitic material; the Hermon developed on deep till; and areas of imperfectly and poorly drained Sutton and Whitman soils. Included with the Shapleigh are some deeper soil areas having shallow dull-brown and grayish profiles similar to those of the Shapleigh. These included areas occur where Shapleigh soils are near Charlton and Paxton soils.

A few seepage and marshy spots are normal to Shapleigh soils and are not indicated on the map unless they affect management of a field. There are also areas of less than 5 acres against steep ridges and at the confluence of drainageways where thin streaks of gravel or sand are mixed with the shallow till. The series is represented by Shapleigh loam and its sloping and steep phases.

Shapleigh loam (0–8% slopes) (SD).—This stone-cleared and well-drained soil occurs on the tops of glacier-smoothed ledgy ridges, on gently sloping to undulating benches along mountainsides, and on nearly level ledge exposures in valleys. Some ledge outcrops and a few stones (mostly pegmatite, granite, or gneiss) normally occur, but the land is tillable and at least 12 to 30 inches deep to underlying rock over 70 percent of its area. An occasional glacial erratic 4 or 5 feet in diameter and small imperfectly drained or marshy areas may occur.

Most of the Shapleigh areas are small and irregular. The soil is associated primarily with the Canaan soils developed on shallow till and the Hermon on granitic deep till. It is also associated with the shallow phases of the Sutton soils and to a limited extent with the poorly drained Whitman soils.

The following is a generalized profile description of Shapleigh loam as it most frequently occurs:

0 to 5 inches, dark-brown to brown very friable loam; very strongly acid.
5 to 12 inches, yellowish-brown slightly firm but friable loam; very strongly acid.

12 to 18 inches, pale yellowish-gray gritty loam to fine sandy loam till; friable; very strongly acid.
18 to 20 inches, olive gritty till, firm in places but friable; very strongly acid.
20 inches +, hard pegmatite rock.

The profile is variable, as are those of all shallow soils, particularly in depth to bedrock and in colors; but the foregoing description is representative.

Approximately 60 percent of Shapleigh loam is cultivated; the rest is in orchards, hay, or pasture. Fields tend to be small and irregular because the shallower ledgy areas are avoided and only the deeper ones are cultivated. Farms tend toward the subsistence type; vegetables, small fruits, poultry, and other crop or animal specialties are produced for cash income. Under improved management, the soil will produce good yields of small fruits and vegetables. Hay and pasture are ordinarily not fertilized or limed.

Although this soil is generally not subject to accelerated erosion, any loss of soil is serious on a soil so shallow. Conservation measures, including long rotations and contour tillage wherever possible, should be used.

Shapleigh loam, sloping phase (8–16% slopes) (SE).—Though similar to Shapleigh loam, this soil occurs on more sloping and rolling glacier-smoothed ledge ridges, mountainsides, and exposures of gneiss and pegmatite in valleys or along the bay front. Ledge outcrops and boulders occur to a limited extent, but the land is tillable and at least 18 inches deep to underlying rock over 70 percent of its area. Like Shapleigh loam, this soil has a dark brown profile to a depth of 5 inches, but its total depth to bedrock is generally a little less. It is associated with about the same soils as Shapleigh loam.

More of Shapleigh loam, sloping phase, is in orchards and pastures, and fields tend to be larger than on Shapleigh loam, but the cultivated area (about 40 percent of the total) is just as irregular and small. Under improved management yields are about the same as on Shapleigh loam. Orchards and general farms are more prevalent on this phase than on other soils in the southeastern parts of the county. If this sloping phase is used for pasture, hay, or timber, to which it is best suited, erosion is not a problem.

Shapleigh loam, steep phase (20–30% slopes) (SF).—This soil occurs on steep to hilly mountainsides where rock outcrop is common. It is similar to the normal and sloping phases of Shapleigh loam in profile characteristics but is only about 10 inches deep to bedrock, and its surface layers are thin. Ledge outcrops, stones, and boulders occur more frequently than on either the normal or the sloping phase, but the soil between the ledges is at least 10 inches deep over 60 percent of the area. Imperfectly drained areas occur in places on this phase; poorly drained ones are rare because of the steepness of the slopes.

Shapleigh loam, steep phase, is mostly in orchards, pasture, and timber. Most of the soil is best suited to grass or forest. The idle or abandoned areas have a cover of young aspen, birch, and spruce.

STETSON SERIES

Soils of the Stetson series occupy smooth glacial outwash on nearly level to undulating or sometimes gently rolling topography that in-

cludes deltas, kame terraces, outwash plains, and such land forms. Two good examples of this topography are just north of Monroe on the road to Winterport and southeast of Liberty. The deposits underlying Stetson soils are composed of stratified, or alternating, bands or layers of sand and gravel that continue to a depth of at least 75 feet. Stetson soils are yellowish-brown, yellow, and olive from the surface to the substratum, where a rather dark olive color predominates. The substratum is usually porous and contains limy material, which appears as encrustations on pebbles of granite and gneiss and as fragments of lime rock at 6 to 8 feet. The surface texture ranges from coarse sand to sandy loam but none of the Stetson soils are as coarse as those of the Etna series, and, except for a rare glacial erratic or two, they are not stony or cobbly.

The Stetson soils are or have been generally cultivated. Under good management most of them produce rather high yields of corn, potatoes, beans, peas, oats, and grain. The more open and porous types are being abandoned or converted to white pine or blueberrry plantings. Because of more or less level relief and excellent internal drainage, Stetson soils erode only on the steep areas. Since most of these areas are timbered, erosion is not important. The series is represented by Stetson fine sandy loam; Stetson loamy sand; Stetson gravelly sandy loam and its steep phase; and Stetson-Suffield very fine sandy loams.

Stetson fine sandy loam (0–8% slopes) (Sɢ).—Areas of this soil are generally somewhat small and regular and occur principally in the central and northern parts of the county. The texture ranges from loamy very fine sand to a sandy loam but is generally fine sandy loam. The soil is associated with others developed on outwash, as the Melrose, Adams, Agawam, and Sudbury soils, and to a limited extent with the Ondawa, which is on bottom land. It differs from all of the soils developed on outwash in having gravel layers in the profile, and from Ondawa in not being subject to overflow.

The following description gives the chief characteristics of Stetson fine sandy loam:

0 to 7 inches, dark grayish-brown mellow fine sandy loam of weak crumb structure; acid.
7 to 10 inches, dark-brown very slightly compact fine sandy loam; medium acid.
10 to 15 inches, light yellowish-brown slightly firm to loose fine sandy loam; medium acid.
15 to 25 inches, pale-yellow loose fine sand with a greenish tinge; medium acid.
25 to 36 inches, pale-olive loose fine sand with a yellowish tinge; medium acid.
36 to 72 inches, dark-gray loose sand; medium acid.
72 inches +, bedded slightly compact dark-gray fine gravel and fine sand; slightly acid to neutral; gravel may be coated with lime below 8 feet.

Some coarser textures and differences in the stratification of the gravel and sand in the subsoil may occur.

More than 80 percent of Stetson fine sandy loam is cultivated. Good crops of potatoes, corn, beans, peas, and truck crops are grown in all except the extremely dry years. Some slight to moderate erosion occurs on undulating parts of cultivated fields but simple conservation measures are usually adequate to control it. Orchards are not grown on this soil or any of the other Stetson soils with nearly level relief. Some areas of this soil are in pasture and hay and a few others are

in timber. There are some exceptionally good stands of white pine, fir, and oak on timbered areas.

Stetson loamy sand (0–8% slopes) (SL).—The surface soil of this type is somewhat coarser than that of Stetson fine sandy loam. The remaining layers, however, are much like those described in the profile for the fine sandy loam, although the gravel may be much deeper. The soil occurs on nearly level to undulating outwash terraces and shows the relief normal to nearly all the soils occurring on terraces. The areas are broad and large and occur in several places in the central and southern parts of the county. Because of coarser surface soil, the few cultivated areas of this soil are sometimes droughty.

The soil is associated with the Adams, Melrose, Sudbury, and Etna soils. It differs from the Adams and Melrose in lacking clay in the substratum, from the Sudbury in having better drainage, and from the Etna soils in not having cobbly and stony material in the profile. Stetson loamy sand is in places sandy in the substratum, but gravel usually occurs as bands or layers at a depth of 70 inches or more.

Less than 30 percent of Stetson loamy sand is cultivated. By far the largest part is in fairly good stands of pine, spruce, fir, aspen, maple, and oak. Intensive lumbering and fire have destroyed the woodland in places. Cultivated areas are mostly in gardens, berries, and ornamental plants; yields are good when the land is sufficiently fertilized, limed, and watered. Yields are lower than those for Stetson fine sandy loam.

Stetson gravelly sandy loam (0–8% slopes) (SH).—This is the coarsest of all the Stetson soils. Although slopes are generally less than 8 percent, the soil is for the most part more undulating than either Stetson fine sandy loam or Stetson loamy sand. Most of the surface gravel on this soil is ½ to 4 inches in diameter, or an average of about 2 inches. The gravel is usually gneiss and granite mixed with a good bit of finer flat-sided gravel of schist and phyllite or quartzite. It occurs on the surface as well as within the profile, becomes limy in the substratum, and where it covers the ground interferes somewhat with tillage. The gravel in the subsoil tends to make the land droughty.

The soil is distributed mainly in the central and southern parts of the county along remnantal glacial river channels. The narrow to broad winding areas are small and are associated chiefly with the Etna and Adams soils. This soil differs from those of the Etna series chiefly in containing bands of small-sized gravel rather than a heterogenous mixture of large and small cobblestones and gravel. It differs from the Adams in having limy gravel instead of clay in the lower profile.

The following describes a profile of Stetson gravelly sandy loam in a forested area:

0 to 3 inches, dark grayish-brown gravelly sandy loam of weak crumb structure; medium acid.
3 to 5 inches, light-gray gravelly loamy sand of single grain structure; strongly acid.
5 to 8 inches, very dark-brown slightly compact gravelly loamy sand to gravelly sandy loam; strongly acid.
8 to 22 inches, brownish-yellow firm but friable sand and gravel; medium acid.

22 to 38 inches, dark-gray slightly compact coarse gravel; medium acid.
38 to 96 inches, dark-gray fine gneiss and gravel; medium acid.
96 inches +, dark-gray gravel and sand; in places below 8 feet may be slightly calcareous.

The soil is cultivated to almost as great an extent as Stetson fine sandy loam and to a greater extent than Stetson loamy sand. About 70 percent of the land is tilled. Crops are similar to those on Stetson fine sandy loam but yields tend to be lower, mainly because the gravel causes irregular seeding. Manure, lime, fertilizer, and green-manure crops or long rotations are necessary to maintain good yields.

Stetson gravelly sandy loam, steep phase (20–35% slopes) (SK).—The soil occurs along fronts and sides of outwash terraces that adjoin drainage channels and streams. It has thin surface layers. Otherwise its profile is fundamentally the same as that described for the Stetson gravelly sandy loam. This steep phase is excessively drained both internally and externally. The areas are narrow and winding, especially where associated with the Etna series. Included with this phase are sandy areas on the steep slopes.

Nearly all of Stetson gravelly sandy loam, steep phase, is forested with good stands of pine, spruce, fir, ash, beech, and other northern hardwoods. Some burned-over areas, however, support only aspen, scrub oak, and maple or yellow birch. Harvesting for cordwood or pulpwood and striplot cutting has removed most of the timber. The cut-over areas are sometimes pastured.

Stetson-Suffield very fine sandy loams (0–8% slopes) (SM).—This complex of soils occurs in nearly level to strongly undulating transitional areas where deposits of both sand and clay are so intricately associated that separation into component soils was not feasible. The sandy outwash fingers in the clay basins have chiefly slopes of less than 6 percent but in a few places may have slopes of 8 percent. The areas composed of clay are usually on slopes of less than 3 percent, but these may range to 6 percent. Most of the complex occurs near Monroe and Winterport in the central, eastern, and northeastern parts of the county. The areas are usually small and irregular.

This complex is closely associated with the complex of Etna-Hartland very fine sandy loams and occurs also with Stetson, Suffield, Melrose, and Hartland soils, and with the Buxton-Biddeford complex. The member soils of the Stetson-Suffield complex are well drained and differ from the poorly drained Biddeford and imperfectly drained Buxton soils in this respect. The Hartland soils are finer textured and the Melrose are sandier than those in this complex.

In most fields the soils of this complex have a high percentage of fine sand and clay in the surface soil and a few patches of gravel and clay. Small marshy areas, outcrops, or large stones occur in transitional areas.

Approximately 40 percent of Stetson-Suffield very fine sandy loams is cultivated, an equal amount is pastured, and the rest is in forest and orchards. Canada bluegrass, clover, and other grasses grow well. Oats, sweet corn, and silage corn are grown. Corn is seldom grown for grain because it ripens late. Potatoes are produced mainly on the Stetson parts of the complex. Berries give high yields.

SUDBURY SERIES

The soil of the Sudbury series occurs on nearly level sandy deposits of till and outwash where a drainage system is not yet established. It is associated with Etna, Stetson, Agawam, and Melrose soils. Very few stones or gravel occur in Sudbury soil. In some places the substratum is silt and clay instead of the usual semisaturated sand or sandy clay. From a depth of about 20 to 34 inches Sudbury soil is slightly mottled gray and yellow or brown, as it is frequently saturated with water at that depth. The drainage of the lower part of the Sudbury soil is much like that in corresponding parts of Acton and Sutton soils of the uplands. Erosion is not a serious factor in cultivation of Sudbury soil, because slopes are gentle. The Sudbury series is represented by one type—Sudbury fine sandy loam.

Sudbury fine sandy loam (0–3% slopes) (Sn).—This imperfectly drained soil developed from sands and some gravel of mixed origin. It occurs on nearly level outwash. The soil usually occupies long narrow areas between tracts of well-drained upland and terrace soils. Nevertheless, there are broad and large bodies of it on the delta or outwash plains near Monroe. Although stones and gravel are not common, they do occur in a few small areas designated by symbols on the map.

The profile is variable because Sudbury fine sandy loam is associated with so many different soils of the terraces. The one described as follows, though not a specific profile, is representative in most characteristics:

0 to 8 inches, dark-brown to dark grayish-brown mellow fine sandy loam of weak crumb structure; strongly acid.
8 to 20 inches, yellowish-brown to pale yellowish-brown slightly firm fine sandy loam to loamy fine sand; strongly acid.
20 to 34 inches, mottled yellow and gray loamy sand to coarse loamy sand; less firm than layer above; strongly acid.
34 to 48 inches, gray loamy sand to coarse loamy sand only slightly firm; saturated; strongly acid.
48 inches +, gray sand, sandy clay, or clay.

Clay may be encountered at 40 to 60 inches below surface.

About 50 percent of Sudbury fine sandy loam is in pasture or hay; the rest is in forest. Forest stands are usually dense and are composed of spruce, hemlock, fir, maple, birch, and aspen. In a few places adjacent to bottom land the stand may include white pine, willow, and elm. Slopes are gentle and impaired drainage usually prevents the growing of cultivated crops that might encourage erosion.

SUFFIELD SERIES

Soils of the Suffield series are associated with imperfectly drained Buxton, the poorly drained Biddeford, and the erosive Hartland soils. They differ from the Buxton and Biddeford soils in being better drained. They are much like the Hartland soils in profile but have smoother relief and are not so erosive. Suffield soils occur on nearly level to gently rolling, well but slowly drained, neutral to slightly alkaline, old marine or lacustrine deposits of silt and clay. Stones and rock edges seldom if ever occur in Suffield soils, but some imperfectly and poorly drained spots are included.

The Suffield soils are generally cleared, and except for some smooth areas of Hartland soils, they are the best in the county for hay and

pasture. Large areas of Suffield soils are cultivated to oats, corn, potatoes, and small fruits or garden vegetables. Orchards do not thrive. Erosion is moderate; simple conservation practices are sufficient for its control. The series is represented by Suffield fine sandy loam and its eroded phase, and Suffield silt loam and its eroded and severely eroded phases.

Suffield fine sandy loam (3–8% slopes) (So).—The small, rather long areas of this soil occur on tops of undulating hills or knolls in the eastern and central parts of the county. The total acreage is not large. The individual areas are associated with the well-drained Hartland and Bangor and the imperfectly and poorly drained Buxton and Biddeford soils. The soil may be subject to some sheet erosion where the more sloping parts of the fields adjoin the incipient drainageways common in Suffield soils.

Profiles of Suffield fine sandy loam are fairly uniform, as are all those of the clay-derived soils. The following is a representative profile from a cultivated field:

0 to 4 inches, dark grayish-brown fine sandy loam having a fine crumb structure; acid.
4 to 8 inches, yellowish-brown fine sandy loam of fine crumb structure; acid.
8 to 18 inches, pale yellowish-gray firm but friable loam; acid.
18 to 30 inches, pale yellowish-gray somewhat compact gritty fine sandy clay; acid.
30 to 38 inches, mottled gray and yellow compact massive silty clay; coarse crumb to fragmental structure; mildly acid.
38 to 60 inches, dark-gray compact massive clay mottled with pale yellow; mildly acid.
60 inches +, alternating bands of fine sandy clay and clay; slightly acid.

Suffield fine sandy loam is a good crop soil because it has a moisture-storing layer of fine sandy loam extending to 10 or 15 inches below the surface, and below that, a layer of clay. It is a good soil for truck and ornamental gardens and is especially valuable where it occurs near arterial highways or large population centers. Yields are very high if lime and fertilizer are properly applied, but somewhat low if they are not. About 90 percent of the land is cultivated.

Suffield fine sandy loam, eroded phase (3–8% slopes) (Sp).—This soil is entirely in cultivation. Erosion has removed the sandy mantle to such extent that the underlying clay is reached by plowing at the ordinary depth of 4 to 6 inches. The soil is associated with the same soils as Suffield fine sandy loam and has about the same general characteristics. The profile is like the one described for Suffield fine sandy loam, except that it is truncated and surface layers are thin or entirely lacking. The fine sandy loam surface mantle rarely exceeds 6 inches and may be only 2 or 3 inches thick. Small areas of gravelly sandy clay soil are included. These included areas occur near sloping soils on outwash, predominantly near the Etna soils.

Most of Suffield fine sandy loam, eroded phase, is tilled. Oats, beans, peas, corn, a few potatoes, small fruits, and vegetables are grown. Rather large quantities of manure and fertilizer are required to obtain high yields. Lime is not generally required but should be applied where the acidity of the soil must be reduced for production of clover or other legumes. Diversions, contour tillage, and use of long rotations are necessary to conserve the sandy surface of this soil and maintain fertility.

Suffield silt loam (3–8% slopes) (Sr).—Rather small narrow fairly smooth bodies of this soil occur in the northeastern part of the county near Winterport. They are there associated with the Hartland, Buxton, Biddeford, and, to lesser extent, the Melrose soils. The soil has developed on silt and clay deposits like those from which Hartland soils were derived and has a profile similar to Hartland silt loam. Relief is level to undulating (pl. 8, *B*). The soil is well but somewhat slowly drained.

Following is a profile description:

0 to 6 inches, dark grayish-brown silt loam of fine granular to crumb structure; slightly acid.
6 to 15 inches, dark grayish-brown crumb-structured silt loam; slightly acid.
15 to 20 inches, grayish-brown silty clay loam; somewhat compact in places but breaks into a crumb-structured mass; slightly acid.
20 to 30 inches, faintly mottled gray, pale-yellow, and rusty-brown silty clay; compact and massive in places but has fragmental breakage; slightly acid.
30 to 38 inches, very compact mottled gray and yellow clay; breaks into irregular angular hard clods; slightly acid.
38 inches +, dark-gray massive clay, somewhat plastic when wet and hard when dry; becomes laminated below 5 to 6 feet; slightly acid to neutral.

The soil is more or less uniform, though some variations occur in thickness of the surface layers and the degree of drainage. Imperfectly drained spots normally occur and mottling is pronounced.

About 20 percent of Suffield silt loam is cultivated; the rest is in pasture and hay or to a small extent in timber. Clover and timothy hay do well, as this is one of the leading grass soils in the county. Corn, beans, and oats are also grown.

Suffield silt loam, eroded phase (3–8% slopes) (Ss).—This soil developed from marine silt and clay. It occurs on nearly level to sloping or undulating relief, mainly in the northeastern part of the county, and is associated with the same soils as Suffield silt loam. The small irregular areas occur principally in cultivated fields along incipient drainage channels. This soil is a little more undulating than Suffield silt loam. Sheet erosion is noticeable but not excessive. Some rills or very shallow gullies usually appear in exposed spots on fields. The profile is similar to the one described for Suffield silt loam, though the surface layer is not so deep and paler in color. Included with this soil are some small areas of Suffield fine sandy loam so eroded that less than 4 inches of sandy covering remains.

Approximately 70 percent of Suffield silt loam, eroded phase, has been cultivated. Some fields are now idle or in hay. The rest of the soil is in pasture and supports exceptionally good stands of Canada bluegrass, clover, timothy, redtop, and other grasses.

The soil is still rather productive in spite of erosion. Corn, beans, oats, millet, and small fruits give fairly high yields if adequate fertilizer and manure are applied. Contour tillage, use of rotations that include at least 2 years of grass, and other simple conservation practices are usually sufficient to maintain the remaining surface soil.

Suffield silt loam, severely eroded phase (3–8% slopes) (St).—In some places this phase is eroded to the subsoil; in others rills have cut through to the substratum. The small, generally long and narrow areas occur along entrenched streams, principally in the valleys of the Marsh and Penobscot Rivers. The soil is associated with the Hartland soils and Etna-Hartland very fine sandy loams. It occupies

generally undulating topography. Slopes may be as great as 10 percent in few instances, though the dominant range is 3 to 8 percent. The surface layer is thinner, lighter in color, and more compact than that of Suffield silt loam, but the lower part of the profile is similar. Included with this soil are small areas of Suffield fine sandy loam from which erosion has removed all but about 4 inches of the sandy covering.

Approximately 40 percent of Suffield silt loam, severely eroded phase, is cultivated. The rest is mainly in pasture. The chief crops are corn, oats, beans, and berries. The included bodies of Suffield fine sandy loam are better land than the surrounding areas of this soil and are intensively cultivated to garden crops, berries, and ornamental plants. Keeping this soil in grass is the best way to control erosion.

SUTTON SERIES

Soils of the Sutton series occupy fairly large to very small rounded or elliptical tracts throughout the county. They occur in slight depressions on the wide tops of till ridges or moraines and on gentle slopes of mountains and sides of valley ridges where seepage is sufficient to cause imperfect drainage. Relief ranges from 0 to 16 percent for the series, though most of the soils have slopes of less than 8 percent.

Sutton soils are brown or yellowish brown, acid, and friable; they have developed on gneissic and schistose till. Stones and small boulders occur frequently on the surface but there are only a few ledge outcrops or large glacial erratics 4 to 5 feet in diameter. Local wash from surrounding slopes apparently has covered some of the stones originally exposed.

The Sutton soils are closely associated with the Paxton, Charlton, Hollis, and, to limited extent, the Westford soils. They are like these soils in being developed from schistose material; they differ from all of them in having imperfect drainage, and from the Hollis and Westford in having deeper soil material. The Sutton series is represented by Sutton loam and its sloping phase, Sutton stony loam and its sloping and shallow phases, and Sutton very stony loam.

Sutton loam (0–8% slopes) (Sʊ).—This soil developed on deep and imperfectly drained gneissic and schistose till. The areas are small, rounded or elliptical, and occur in all parts of the county. The soil is generally stone-cleared. A few stones are scattered over some areas but not in numbers sufficient to interfere with ordinary tillage practices. Ledges and marshy spots occur and are indicated by symbols on the map. The soil is associated primarily with the Charlton and Paxton, although it may occur with the Hollis. It differs from the associated soils in having imperfect drainage; it is similar to them in parent materials.

The profile of this phase is more uniform in color and texture than are those of other Sutton soils, but the degree of saturation in the lower subsoil varies as much. The saturation of the subsoil is indicated by its mottled gray, yellow, and rusty-brown colors. In some places the mottling occurs at 18 inches, in others at 36 inches. The following representative profile gives the chief characteristics of Sutton loam:

0 to 6 inches, dark yellowish-brown loam having a weak crumb structure; strongly acid.
6 to 12 inches, yellowish-brown firm but friable loam; strongly acid.

12 to 20 inches, pale-yellow firm loam slightly mottled with gray; strongly acid.
20 to 36 inches, mottled gray and yellow, streaked with brown, slightly compact gritty loam; medium acid.
36 inches +, olive gritty till having a somewhat platy structure; contains boulders and fragments of schist and gneiss; medium acid.

Approximately 30 percent of the Sutton loam is cultivated; the rest is in pasture. Small fruits, oats, corn, millet, peas, beans, and potatoes are the leading crops. Because of its imperfect drainage, there are no orchards on this soil. Some isolated fruit trees may be planted but they usually live not more than 15 years. Many have died in less time. This soil needs lime, manure, and complete fertilizer to maintain good yields of cultivated crops, hay, and pasture.

Sutton loam, sloping phase (8–16% slopes) (Sv).—This soil is much like Sutton loam in general profile characteristics but has steeper slopes. Though associated with the same soils as Sutton loam in the same general areas, bodies of this soil are larger and more irregular. The soil is stone-cleared, but in areas transitional to other soils, it may contain more gravel and stones than usually appear in Sutton loam. Exceptionally bouldery or stony areas where the soil is cultivated or is likely to be cultivated are indicated by map symbols.

Approximately 20 percent of Sutton loam, sloping phase, is cultivated, and the rest is pastured or is in hay. Canning corn, field corn, beans, oats, and potatoes are grown, though the soil is best suited to hay and pasture. It is not suitable for orchards.

Sutton stony loam (3–8% slopes) (Sw).—In this separation are the more level imperfectly drained stony areas of Sutton loam. The soil has developed on deep gneissic and schistose till. It occupies fairly large and regular tracts on mountainsides and the tops of ridges in the central, southeastern, and northwestern parts of the county. Frequently it is associated with soils of the Paxton, Charlton, and Hollis series, and with rough stony land.

Rounded stones 4 to 6 and 15 to 20 inches in diameter are distributed more or less evenly over the soil. The stones are sufficiently scattered to make clearing of the land possible though not economical. An occasional erratic 2 to 3 feet or more in diameter occurs where this soil is near areas of rough stony land.

The following describes a representative profile:

0 to 2 inches, dark grayish-brown mixed organic matter and mineral soil; strongly acid.
2 to 4 inches, light-brown friable loam; strongly acid.
4 to 12 inches, yellowish-brown firm but friable loam; strongly acid.
12 to 20 inches, pale-yellow, slightly mottled with gray, heavy loam; firm but friable; strongly acid.
20 to 36 inches, mottled gray and yellow or brown gritty loam; compact; medium acid.
36 inches +, olive semisaturated gritty till; compact and fairly dense; medium acid.

The entire profile contains boulders and fragments of schist and gneiss. In degree of saturation and in thickness and color of surface layers the soil varies somewhat from the profile just described.

Sutton stony loam is for the most part covered by good stands of hemlock, spruce, fir, and white pine mixed with some birch, aspen, and northern hardwoods. Some of the soil is cleared, however, and

is now in stony pastures and orchards. Under the management ordinarily practiced, the carrying capacity of the pastures is about 100 cow-acre-days.

Sutton stony loam, sloping phase (8–16% slopes) (Sy).—This phase occurs on the sides of ridges and mountains. It developed on deep gneissic and schistose till with impaired drainage or on seepage areas in otherwise well-drained till. It is associated with Charlton, Paxton, and Hollis soils and to a limited extent with Rough stony land (Paxton soil material) in the south-central and eastern parts of the county. This phase is similar to Sutton stony loam in profile but includes a few more stones and erratics, as well as some ledge outcrops.

Sutton stony loam, sloping phase, is generally timbered. Only a few areas are in pasture and occasional orchards. Fruit trees are usually short-lived and not productive, so orchards are not recommended.

Sutton stony loam, shallow phase (3–8% slopes) (Sx).—This is the only shallow soil mapped in the county that has imperfect drainage. It occurs in small irregular areas, mainly on the tops and sides of mountains, and covers only a small total acreage (pl. 9, *A*). The dominant characteristic of this phase is the frequent occurrence of weathered usually smooth ledge outcrops. The soil between the outcrops developed from imperfectly drained to slightly saturated till and ordinarily is not more than 40 inches deep to bedrock. This phase is associated with the Thorndike, Canaan, Shapleigh, Hollis, and Westford soils, and with almost all others developed from shallow till.

This shallow soil is generally very dark gray in the upper part and mottled gray, brown, or yellow in the lower. The texture is usually loam. Small stones are scattered on the surface and throughout the soil and the till substratum. There are many inclusions of other shallow imperfectly drained soils. Included are areas more like Dixmont or Acton soils, a few seep or wet spots, and larger marshes indicated by symbols on the map.

Most of Sutton stony loam, shallow phase, is timbered; stands consist of ground hemlock, maple, spruce, some cedar, and a scattering of other trees. A few almost stone-free areas are pastured.

Sutton very stony loam (3–16% slopes) (Sz).—This soil is composed of very stony areas on imperfectly drained deep till. It is widely distributed over the county in somewhat broad and irregular tracts. Some tracts, however, are less than 5 acres in size. The soil occurs in many less sloping areas on mountainsides and on interstream areas where quantities of stones and boulders are mixed in the till and on the surface (pl. 9, *B*). It is associated with rough stony land and the stony members of all the soils developed on deep till. Ledges occur occasionally but surrounding areas are on deep till and have impaired drainage.

The profile is rather variable. That described for Sutton stony loam is representative, though this soil is more stony. Areas of Acton and Dixmont soils are included with Sutton very stony loam in mapping. In color and texture of surface layers the included soils show some differences from this soil, but their subsoil is somewhat the same in drainage.

Nearly all of Sutton very stony loam supports a good stand of mixed northern hardwoods, spruce, fir, and hemlock. With proper lumbering, saw timber possibly could be cut at least twice in a 50-year period. Most cutting is now for pulp and cordwood. The soil is excessively stony; harvesting timber is difficult until winter snows cover some of the stones.

THORNDIKE SERIES

Soils of the Thorndike series occur in the northeastern and north-central parts of Waldo County, where they occupy rather high steeply rolling narrow ridges, some sloping hills that flank higher ridges of deep till, and a few low areas in valleys where ledges have been exposed by geologic erosion. General relief ranges from undulating to mountainous, and microrelief is usually rough because of protruding ledges and large gravel. Most smoother areas of Thorndike soils are cultivated.

Thorndike soils have developed from shallow well-drained loose somewhat gravelly limy quartzitic, schistose, phyllitic, and slaty till that overlies calcareous quartzite, phyllite, or slate. The till is a few inches to about 40 inches deep at the deepest points between ledges. The ledge outcrops effervesce at the limy seams between laminations when dilute hydrochloric acid is applied. Some of the ledges, however, effervesce over the entire face, and this indicates that most of the formation is limy.

The rock formations are definitely laminated and they weather unevenly. In weathering, masses of loose material spotted and streaked with brown form between harder rock strata. The weathered material is usually bluish gray or light grayish brown, and oxidized spots of hematite or limonite are prominent in the minerals of the rock.

Associated with the shallow Thorndike soils are the well-drained Bangor, imperfectly drained Dixmont, and poorly drained Burnham soils, all of which are on deep till. Also mapped with the Thorndike are some Hollis soils and limited areas of Sutton stony loam, shallow phase. The cultivated land is susceptible to erosion and control measures are necessary in many fields.

The Thorndike series is represented by the following types and phases: Thorndike gravelly silt loam and its rolling and hilly phases; Thorndike silt loam and its moderately eroded, sloping, eroded sloping, hilly, and eroded hilly phases; and Thorndike stony silt loam and its hilly phase.

Thorndike gravelly silt loam (0–8% slopes) (TA).—This soil developed on well-drained, shallow till of limy phyllite or slate. The rather narrow and irregular areas are distributed in the Jackson-Thorndike-Unity part of the county. This soil is similar to Thorndike silt loam, although it has a greater quantity of limy schistose, slaty, and phyllitic gravel on the surface. It is also a little more rolling or steep in general relief and a little thinner in the solum.

Eroded areas of Thorndike gravelly silt loam are not shown as a separate phase because most of them are now pastured or in hay or blueberries, and under such use they do not erode readily. Map symbols are used to indicate noticeable erosion in areas used for cultivated crops.

Following is a profile description of Thorndike gravelly silt loam in a cultivated field:

0 to 6 inches, dark-brown mellow gravelly silt loam of weak crumb structure; strongly acid.
6 to 14 inches, brownish-yellow gravelly firm but friable silt loam having a weak crumb structure; strongly acid.
14 to 20 inches, light yellowish-brown, slightly tinged with green, mixture of phyllite and slaty fragments and soil material; slightly acid.
20 inches +, ledges of lime-seamed dark phyllite or slate.

The profile of Thorndike gravelly silt loam varies somewhat, but the one just described is representative of cultivated land that has been subject to slight erosion. Along some drainageways in the valleys this soil tends to vary more in texture and is sandy in certain localities where some outwash material is mixed with the shallow limy gravelly till.

Nearly all of Thorndike gravelly silt loam is stone-cleared and about 70 percent is or has been cultivated. Some of the land is now idle or in pasture or hay; most of it supports fairly good crops of potatoes, corn, and oats, canning peas, beans, and corn and other truck crops, and small fruits. Orchards are not generally planted on this soil because the ledges are so close to the surface.

Thorndike gravelly silt loam, rolling phase (8–16% slopes) (Tc).—This soil occurs on shallow till in slightly dissected parts of high ridges. The soil contains a little more gravel than Thorndike gravelly silt loam and usually more ledge outcrops. It is associated with the same soils as Thorndike gravelly silt loam, however, and occurs in the same localities. The areas are long, narrow, and generally rather extensive. The profile is like the one described for the Thorndike gravelly silt loam.

Good yields of potatoes, corn, peas, beans, and clover and timothy hay are obtained. The limy parent material of this soil encourages legume growth and tends to offset the disadvantages of a shallow profile and gravelly material. Orchards grow only moderately well, however, probably because the soil is thin over the ledges. As a general rule the land is pastured or in hay, but about 20 percent is in cleared fields where potatoes, corn, beans, or peas are grown. Erosion is not particularly evident in these new fields. Some slight sheet erosion normally occurs, however, and areas noticeably eroded are indicated by map symbol.

Thorndike gravelly silt loam, hilly phase (15–30% slopes) (Tb).—This soil developed from shallow well-drained till derived from limy phyllite, slate, and quartzite. Most of it is on hillsides, ridges, and some mountain flanks where relief is steep and hilly. The dominant range is 15 to 30 percent, though some slopes reach 40 percent. Limy ledges outcrop frequently but are usually low and weathered. This phase is associated with the same soils and occurs in the same localities as Thorndike gravelly silt loam. The soil profile, although similar in other respects, is generally thinner. Eroded areas in fields now used for pasture, hay, or orchards are indicated by map symbol.

Although more or less stone-cleared, none of this phase is now in cultivated crops. It is used mainly for hay, pasture, and orchards.

Orchard trees do not grow well. The land is best used for improved permanent pastures because it supports good stands of Canada bluegrass, clover, and other legumes.

Thorndike silt loam (0–8% slopes) (TD).—This soil occurs on the tops of long somewhat narrow ridges and on their sloping sides, and also in shallow areas on the tops of the broad ridges of deep till associated with Bangor soils (pl. 10, *A*).

The soil developed on the deepest parts of the shallow till parent to Thorndike soils. The average range in depth of soil and till is 25 to 35 inches, but at one extreme the soil may be only a few inches deep over ledge rock, and at the other, several feet deep where it is near the deep till underlying Bangor soils. Usually there is some surface gravel consisting of flat angular fragments of limy schist and phyllite or micaceous fine gneiss. Within the soil is a moderate quantity of finer material and occasional larger stones.

In transitional areas the soil is associated with those of the Charlton, Paxton, Bangor, Sutton, and Whitman series. Usually, however, it occurs with Dixmont and Burnham soils. It includes a few small areas of Charlton, Paxton, and Bangor soils. Small patches having poor drainage are indicated by map symbol. Some erosion occurs wherever the soil is tilled. Only those areas noticeably eroded are indicated on the map by symbol.

Thorndike silt loam varies somewhat because of differences in thickness of the underlying till (pl. 10, *B*). The profile described in the following gives the average depth and normal characteristics:

0 to 5 inches, dark-brown mellow silt loam having a weak crumb structure; strongly acid.
5 to 12 inches, yellowish-brown gravelly loam, slightly compact but friable; contains slivers of slaty material; strongly acid.
12 to 20 inches, pale yellowish-gray gravelly loam, firm but friable.
20 to 32 inches, olive-colored mixture of partly disintegrated dark phyllite or slate and some soil material; medium acid.
32 inches +, hard phyllite and dark slate or shale, more or less alkaline.

About 80 percent of Thorndike silt loam is cultivated. It produces good yields of beans and corn for canning, and of potatoes, strawberries, raspberries, peas, and other truck crops. Some of the land is in hay and pasture. Clover, Canada bluegrass, timothy, and other grasses grow exceptionally well. Oats consistently produce high yields.

Thorndike silt loam, moderately eroded phase (3–8% slopes) (TH).—This well-drained soil from limy ledge material occurs in elliptical or long rounded bodies in cultivated fields. The dominant slope range is 3 to 8 percent but some slopes extend to 10 percent. Light-colored areas and slight deposition at the base of slopes are evidence of some sheet and rill erosion. In the lower part, the profile is similar to the one described for Thorndike silt loam, but the surface layer is thinner. In most respects, however, this soil is similar to Thorndike silt loam.

Crop yields are generally a little lower on this soil than on Thorndike silt loam. Erosion is not excessive. Simple conservation practices such as contour tillage and use of long rotations will control erosion.

Thorndike silt loam, sloping phase (8–15% slopes) (TK).—This soil occupies sides and flanks of ridges and hills. It occurs in the same areas as Thorndike silt loam, is associated with the same soils, and is essentially the same in profile layers. Nevertheless, it may be a little thinner throughout and slightly more gravelly or stony. Included with this soil and indicated by map symbols are some imperfectly and poorly drained spots and slightly eroded areas that may affect the management of fields.

This sloping phase is adapted to the same crops as Thorndike silt loam, but yields are lower because of the generally thinner soil and the more frequent exposure of ledges. About 60 percent of the land is cultivated.

Thorndike silt loam, eroded sloping phase (8–16% slopes) (TF).—Although this well-drained shallow soil from limy ledge material has thinner surface layers, it is similar to Thorndike silt loam in most respects. It is or has been under active cultivation and shows evidence of sheet and gully erosion.

Contour strip cropping and use of long rotations are usually satisfactory because erosion is not severe enough to require complex conservation practices. The crops grown are like those for Thorndike silt loam, but yields are less because of the loss of surface soil through erosion. In places the original surface layers have been removed entirely.

Thorndike silt loam, hilly phase (15–30% slopes) (TG).—This is the shallowest of the stone-cleared shallow well-drained soils developed on limy ledges. It occurs on the steepest areas of the silt loam type. It is associated with the same soils, is located in the same areas, and has the same general profile characteristics as the Thorndike silt loam but may be somewhat shallower. Relief is hilly and there are infrequent outcrops of limy ledges along the crest of ridges and knolls. A few stones and boulders occur in places.

This phase is generally in pasture, orchards, and blueberry or hayfields. Some fields are in potatoes, truck crops, and grain. Canning corn, beans, and peas are not generally grown. The cultivated fields show slight or moderate sheet erosion.

Thorndike silt loam, eroded hilly phase (20–30% slopes) (TE).—This inextensive soil is restricted to actively or recently cultivated fields. It occurs in generally small irregular areas throughout the towns (townships) of Jackson and Thorndike, and is associated more frequently with Bangor soils than it is with the other soils normally associated with Thorndike silt loam. Erosion of this phase has removed the original surface and some of the subsurface soil. Bare rock ledges may be exposed in places on hill crests and along rills or small gullies.

Corn, peas, beans, and potatoes are the principal crops. Yields are low. Most of the soil should be retired from cultivation and placed in grass for pasture or hay. Because the soil has a favorable lime content, even the more ledgy areas support fairly good stands of clover and bluegrass.

Thorndike stony silt loam (8–16% slopes) (TL).—Undulating to sloping, moderately stony and ledgy parts of high ridges and mountains are occupied by this soil. Areas are usually large but are in places narrow and irregular. They are located principally in the towns (townships) of Jackson, Unity, and Thorndike. Slopes range from 0 to 16 percent but are dominantly between 8 and 16 percent. The soil developed from shallow well-drained glacial till derived from underlying ledges of lime-seamed phyllite, schist, quartzite, and slate. Some ledges effervesce along the laminations when dilute acid is applied; others effervesce across the entire face of a freshly broken rock. The soil is usually medium to strongly acid. Most of the stones on this soil are small and came from local limy schist, phyllite, quartzite, and slate. Some gneissic and a few scattered granitic boulders and erratics also occur. This soil is associated with soils of the Bangor, Dixmont, and Burnham series and with the shallow phase of Sutton stony loam.

The profile varies somewhat because of shallowness and irregularity of the ledges but the one described in the following is characteristic of this soil where it is wooded or in stony pasture:

0 to 2 inches, dark grayish-brown stony loam and silt loam having a weak crumb structure; strongly acid.
2 to 3 inches, light-gray leached loam having a weak crumb structure; strongly acid.
3 to 5 inches, light-brown to reddish-brown mellow loam to silt loam having a weak crumb structure; strongly acid.
5 to 10 inches, yellowish-brown slightly firm loam; strongly acid.
10 to 24 inches, pale yellowish-gray, faintly tinged with green, slightly compact gravelly and stony loam; strongly acid.
24 inches +, bedrock of lime-seamed fine micaceous quartzite and phyllite.

The entire profile contains stone, slivers of phyllite, slate, and much quartzite.

Thorndike stony silt loam is similar to other shallow stony types and is for the most part timbered. The timber is generally thin and contains much arborvitae, or white cedar. Land too stony for cultivation is in pasture. The pastures usually support a fair stand of Canada bluegrass, clover, timothy, redtop, wild oatgrass, and other grasses.

Thorndike stony silt loam, hilly phase (16–30% slopes) (TM).—Generally large and irregular areas of this phase occur in the central-northern parts of the county on steeply rolling and hilly parts of narrow high ridges that have many limy ledges. Slopes range from 15 to 40 percent but the dominant range is 16 to 30 percent. Many ledges are exposed and a considerable number of stones and some boulders are on the surface. The ledge exposures are low and rounded and never exceed 10 feet in height. The stones and boulders of gneiss, schist, or granite that do occur on this phase are largely 10 to 30 inches in diameter. Occasionally there is a 4- to 6-foot erratic. Areas having extremely high ledges or appreciable numbers of very large erratics are mapped as Rough stony land (Thorndike soil material).

This phase is associated with the same soils as Thorndike stony silt loam, and the soil layers between the ledges resemble those described for that soil. The profile, however, is thinner. This hilly soil is seldom more than 10 or 12 inches deep. It is suited only to forestry.

TIDAL MARSH

This land type is limited to the estuaries along the shores of Penobscot Bay, to the islands within it, and to the tidewater areas of the Penobscot River. It is subject to periodic inundations from tidewater, is brackish or salty, and supports a rank growth of salt-water or marsh grass. The marshes are commonly separated from the bay by gravelly or cobbly beaches, sand spits, or rock promontories. At low tide some of the marshes may extend from the mainland to islands offshore. A few of the marshes may have peatlike accumulations of marsh grass along the inland margins, but most of them have silt and clay sediments exposed when the tide runs out.

In the past some of the marsh grasses were cut for hay; at present this is not done. The hay was used only as supplemental feed and as a source of salt for the animals during colonial times.

Tidal marsh differs from Fresh water marsh in saltiness and regularity of saturation. Many plants will grow in Fresh water marshes that cannot exist in the salty Tidal marshes. The tides also keep Tidal marshes regularly supplied with salt water, whereas Fresh water marshes depend upon rainfall and surface drainage.

WATERBORO SERIES

The soil of the Waterboro series is characterized by a deposit of nearly black well-decomposed plant remains several feet deep. Waterboro soil occurs in marshes, old lakes, and bogs in various parts of the county but is most conspicuous in the northwestern part. The soil is usually saturated to the surface and supports good growths of timber. Waterboro muck is the only member of the series mapped in this county.

Waterboro muck (0–2% slopes) (Wa).—This soil is composed of black well-decomposed plant remains 1 to 4 feet deep. It occurs along nearly all the waterways of the county. To a depth of 9 to 12 inches the muck usually has a distinctly granular and crumb structure if it is not saturated to the top. If saturated, the surface muck is soupy. Normally the muck is underlain by silt, clay, or sand and contains little peaty material. In certain mountain areas in the towns (townships) of Lincolnville and Montville, however, there are so-called alpine meadows where peaty material is included in the muck. The deposits in those mountain areas are somewhat shallow, as they are underlain by ledges at depths of 2 to 4 feet, and the muck is dark brown instead of black.

No stones occur in the deeper muck deposits, but some large glacial erratics are in one or two areas of shallow muck associated with Whitman stony loam. In a few places shallow areas of Waterboro muck are somewhat similar to the poorly drained Whitman soil, but the lack of stones is characteristic of the muck. Most of Waterboro muck has a pH of 4.0 to 5.0.

Much of this muck was once covered with exceptionally good stands of poplar, spruce, fir, hemlock, larch, and birch. Some areas were covered almost entirely with stands of larch, spruce, and fir. Little white pine grows on this muck.

WESTFORD SERIES [9]

Soils of the Westford series are on well-drained shallow till derived principally from schist and micaceous gneisses that are more or less unweathered. In many respects Westford soils are similar to those of the Hollis series, but there are two distinct differences. Westford soils have less broken schist in their substratum than have the Hollis and are more leached in the surface soil. The Westford soils occur on hard-rock glacier-smoothed schist or micaceous fine gneiss that forms a large part of the mountains in the central and southern parts of the county. The Hollis soil is on the softer more deeply weathered micaceous gneiss or pyritiferous schist occurring more frequently as narrow ridges in the eastern and northern parts of the county.

Westford soils occur largely on the high flanks and tops of mountains and hills, along the backs of narrow ridges, and in valleys where schist and micaceous gneiss exposures occur. Relief ranges from rather level on the tops of mountains or ridges to steep on the mountainsides. Microrelief is rough because there are many exposed ledges. Westford soils are usually associated with those of the Hollis, Sutton, and Whitman series but also occur with the Hermon, Canaan, and Acton. The Westford series is represented in this county by Westford stony loam and Westford very stony loam.

Westford stony loam (8–16% slopes) (WB).—Large areas of this extensive soil are on somewhat steep tops and sides of mountains in the vicinity of Bald Rock and Levenseller Mountains. The extreme range is 8 to 45 percent but slopes range dominantly from 8 to 16 percent. The soil is associated with stony Charlton soils, the shallow phase of Sutton stony loam, and the Hollis soils. The stoniness of this soil, as for the Hollis soils, is mainly a matter of exposed ledges rather than the occurrence of large stones and boulders. The ledges exposed are not over 3 feet high, whereas on Westford very stony loam and Rough stony land (Westford soil material), they are much higher.

The soil mantle is seldom more than 10 inches thick; beneath it is the more or less unweathered hard-rock schist and micaceous gneiss normally associated with Westford soils. In a few places the soil is over shiny nearly black crenulated slatelike micaceous gneiss that weathers to the rusty browns and yellows characteristic of the Westford series. These colors plainly predominate in the profile described in the following:

0 to 3 inches, dark-brown very friable loam of weak crumb structure; very strongly acid.

3 to 5 inches, brown very friable loam having a crumb structure; very strongly acid.

5 to 10 inches, strong yellowish-brown loam, slightly firm but friable; very strongly acid.

10 to 16 inches, light yellowish-brown loam, slightly firm but friable; very strongly acid.

16 to 24 inches, olive, slightly firm loam; very strongly acid.

24 inches +, hard schist bedrock.

[9] Since Waldo County was mapped the Westford and Hollis series have been combined because of the difficulty of separating two soils so similar in profile characteristics. Only the Hollis series is now recognized.

A, Rock ledges on imperfectly drained Sutton stony loam, shallow phase.
B, Irregular microrelief on Sutton very stony loam caused by excessive stoniness and imperfect drainage.

A, Crops on Thorndike silt loam; grass-covered limy ledges in foreground.
B, Thorndike silt loam, showing lamination of underlying limy ledge and depth of soil over it.
C, Characteristic tussock surface and lack of stones on Whitman loam. Soil is poorly drained.

The entire profile contains fragments and slabs of schist somewhat harder and more resistant to weathering than the bedrock under the Hollis soils.

Westford stony loam is wooded with thin stands of aspen, birch, maple, some oak, spruce, and pine. The trees are usually cut for pulpwood or cordwood because they grow so slowly. No forest of saw-timber size has developed since the original stand was cut. Extensive blueberry fields occur in places.

Westford very stony loam (16–45% slopes) (Wc).—Though similar to Westford stony loam in some respects, almost all the surface of this type may be exposed ledges. The soil material that does occur is very thin—seldom deeper than 7 or 8 inches. The large and irregular tracts of this soil occur in the same areas as Westford stony loam and are associated with the same soils, but relief is much steeper and the soil material is shallower and more stony. Only occasional pockets of deeper material occur where this very stony soil is associated with Charlton soils. Most of this Westford soil is on mountain flanks.

Westford very stony loam is for the most part thinly timbered with aspen, yellow birch, some oak, maple, white pine, and spruce. Dwarf hemlock often covers the smoother areas. There are a few blueberry fields on Bald Rock Mountain where some soil material covers the rock ledges. For some reason, probably because of mountainside seepage, trees grow better on this soil than on any of the other shallow stony ones. Sawlogs are sometimes cut, but most cutting is for pulpwood or cordwood. Reforestation is slow. Unless great care is taken in lumbering, large areas become wasteland after the timber is removed. Erosion becomes active after the forest cover is gone and it may remove nearly all of the thin soil mantle.

WHITMAN SERIES [10]

Soils of the Whitman series occur on poorly drained acid glacial till. They are on tops of morainic and glacial drift hills, in valleys between these hills, and on mountains and sides of ridges. General relief is nearly level, but slopes range to 10 percent where seepy or saturated areas occur on the mountains or sides of ridges.

Whitman soils are somewhat saturated throughout and usually stony. Some areas are carpeted with large round granitic and gneissic boulders and stones 15 to 20 inches in diameter. The stones and many tussocks of grass make the surface very rough.

In the more saturated areas, Whitman soils may be covered by a growth of hydrophytic plants and rather dense stands of aspen, gray birch, alder, larch, soft maple, black spruce, and hemlock. Little of the land is cleared, and most of that cleared is in unimproved pasture.

[10] The Whitman series as mapped in Waldo County included a rather broad soil drainage range. In recent years the series has been separated into the poorly drained Leicester and the very poorly drained Whitman because of differences of profile and corresponding differences in use and soil management requirements.

Less stony areas are cleared for hay in a few places. The Whitman series is represented by Whitman loam, Whitman stony loam, and Whitman very stony loam.

Whitman loam (0–3% slopes) (WD).—This poorly drained to saturated loam is developed on deep acid till of mixed origin. It occurs on the tops of glacial ridges and in interstream areas. It is associated primarily with Hermon, Acton, and Canaan soils but occurs also with the Charlton, Sutton, and Hollis. Areas are rather small, rounded or elliptical, and generally stone-cleared. The soil is dark and mottled to within a few inches of the surface. The surface is tussocky (pl. 10, *C*).

The profile described in the following is representative of most stone-cleared areas and shows the predominating characteristics of the soil:

0 to 6 inches, very dark-brown to almost black loam; contains large quantities of organic matter; very strongly acid.
6 to 15 inches, gray loam strongly mottled with yellowish brown; firm in places; very strongly acid.
15 inches +, gray gritty saturated sandy loam till; contains much granite, gneiss, and schist of gravel and boulder size; very strongly acid.

Variations in texture and compaction, or consistence, occur. Actually, the only consistent factors in the profile are the deep acid till material and poor drainage.

Most of the Whitman loam is in pasture, hay, or woods. It is used mainly for hay, which is often composed of tall grasses, sedges, ferns, and bracken. Hayfields are fair; more than a ton an acre can be expected. Ordinarily this soil is not cultivated, but small areas of it are included in some cultivated fields. During dry seasons these small areas produce fairly good yields; in wet seasons the crops drown out unless artificial drainage is installed. With artificial drainage, which is not recommended for this soil, fair yields of silage corn, oats, and field beans can be expected.

Whitman stony loam (0–10% slopes) (WE).—This is the most extensive soil of the Whitman series. It is formed on poorly drained to saturated acid stony deep till of mixed origin and occupies interstream areas and glacial till ridges in the Hermon-Canaan-Acton and Paxton-Charlton-Sutton areas of the county. Stones 10 to 12 inches in diameter are thinly scattered over the soil; most of them are of granite, gneiss, or pegmatite, but some are of schist and phyllite.

Much of this soil has a mucky surface layer 4 to 5 inches thick and, underlying this, 5 to 6 inches of fairly loose black loam or sandy loam. In places the loam layer grades into gray, mottled with yellow, loose coarse sand, sandy loam, or loamy sand. In compactness, texture, degree of stoniness, and saturation the layers vary greatly. For example, the range may be from fine material purely of schist and fine gneiss to coarse material from granite and pegmatite. Colors do not change much, however, and the underlying till is nearly everywhere deep and poorly drained. The soil includes a few marshy areas on the tops of the shallow granitic and gneissic mountains.

Whitman stony loam has little agricultural value but does have value as a source of pulpwood, cordwood, and fence posts. The timber stands usually include a poor growth of alder, willow, gray birch, ferns, and other water-tolerant plants. In some places the growth

is mixed with fairly dense stands of larch, maple, spruce, and hemlock. The better stands produce timber of low commercial value. The brush is used for wattles in construction of fish weirs. Forest species able to stand excessive moisture usually grow rapidly, especially during dry seasons. Such trees become shallow-rooted, however, and blow over easily when they reach a large size. Early cutting or strip cutting is therefore desirable.

Whitman stony loam is seldom cleared; the few areas cleared are used only for pasture. A few areas having a rather thick mucky surface are in cranberry bogs.

Whitman very stony loam (0–10% slopes) (Wf).—This poorly drained to saturated very stony loam occurs on deep till in interstream areas. In general appearance and other characteristics except degree of stoniness, this soil is like Whitman stony loam. It is on acid till, has a thick carpet of rounded stones and boulders 10 inches or more in diameter, and contains many glacial erratics 4 or 5 feet in diameter. Ledge outcrops may also occur. The soil is associated with most of the others derived from deep till.

The profile is variable. Textures and colors vary widely, and in places a 10- to 15-inch surface layer of muck may occur. In general, however, the surface layer is black or very dark brown; usually a loam, sandy loam, or silt loam in texture; and 8 to 15 inches deep. The subsoil is more or less saturated; mottled gray, yellow, and brown; and at least 36 to 40 inches deep. In some places on the sandier parts of the soil there is a 2- to 3-inch leached gray layer 3 to 5 inches below the surface, and underlying that, a dark-brown orterde or ortstein layer 1 to 2 inches thick.

Whitman very stony loam is generally forested and supports poor stands of hemlock, larch, birch, aspen, and alder. Cordwood and pulpwood cuttings are often made and there is some saw timber.

USE, MANAGEMENT, AND PRODUCTIVITY OF SOILS

USE AND MANAGEMENT

General use and management practices for the principal crops of the county are discussed in this section. Included also are general fertilizer and liming recommendations. The most efficient rate and analysis of fertilizer for a given crop vary considerably with the type of soil and its past management. In addition to experience and experimental data on various soil types, the results of chemical soil tests indicate the fertility needs of the area sampled. Basing the fertilizer application on the results of the soil tests usually leads to increased efficiency in the use of fertilizer and lime. The Maine Agricultural Experiment Station and Extension Service maintain a joint service in which soil analyses and fertilizer and liming recommendations are made.

The agricultural soils of the county are grouped according to physiographic position [11] in table 5 and suitable uses, rotations and supplemental practices are suggested for each group.

[11] Additional information on land classification and agricultural use of soils may be obtained from LAND CLASSIFICATION IN WALDO COUNTY, MAINE, Maine Agr. Expt. Sta. Bul. 417, 313 pp., illus., 1943, by A. E. Watson.

TABLE 5.—*Suitable uses, rotations, and supplemental practices for agricultural*

Soil group	Dominant slope	Uses	Rotations
Group 1—Well-drained soils of the smooth outwash, stream terraces, and flood plains:			
Adams fine sandy loam	0– 3	Truck crops, corn, beans, peas, ornamentals, small fruits; soil too level for extensive orchards.	Row, row, and g
Adams loamy fine sand	3– 8		
Agawam loamy very fine sand	0– 3		
Melrose fine sandy loam	0– 3		
Undulating phase	3– 8		
Ondawa fine sandy loam	0– 3		
Stetson fine sandy loam	0– 8		
Stetson gravelly sandy loam	0– 8		
Stetson loamy sand	0– 8		
Group 2—Well-drained level to undulating soils on marine and lake deposits:			
Stetson-Suffield very fine sandy loams.	0– 8	Hay, oats, corn, few truck crops, and small fruits; usually no orchards or potatoes.	Row, grain, and 1
Suffield fine sandy loam	3– 8		
Eroded phase	3– 8		
Suffield silt loam	3 8		
Eroded phase	3– 8		
Severely eroded phase	3– 8		
Group 3—Well-drained rolling to steep soils on marine and lake deposits:			
Hartland fine sandy loam	8–16	Pasture, hay, and some oats.	Row, grain, and 1
Severely eroded phase	8–16		
Severely eroded steep phase	20–35		
Steep phase	20–35		
Hartland silt loam	8–16		
Eroded phase	8–16		
Severely eroded steep phase	20–30		
Steep phase	20–50		

Group 4—Gravelly or very sandy soils on rough glacial outwash and terrace escarpments:			
Adams loamy fine sand, steep phase.	20–40+		
Etna fine sandy loam	8–16		
Etna gravelly sandy loam	8–16		
Hilly phase	20–30		
Etna-Hartland very fine sandy loams.	8–16	Limited truck crops; some pasture, small fruits, or ornamentals; little else suitable except forest.	Row, grain, and 1 t of hay or pastur
Eroded phases	8–16		
Eroded hilly phases	16–30		
Hilly phases	16–30		
Etna loamy sand	8–16		
Hilly phase	20–30		
Stetson gravelly sandy loam, steep phase.	20–35		
Group 5—Stone-cleared level to sloping well-drained deep soils on compact till:			
Bangor gravelly silt loam	0– 8	Corn, peas, beans, oats, hay, potatoes, truck crops, and small fruits; well suited to orchards except where a compact layer occurs at shallow depth.	Row, row, and gree (or row and green on the more lev row, grain, and years of hay on t er slopes.
Sloping phase	8–16		
Bangor silt loam	0– 8		
Moderately eroded phase	0– 8		
Sloping phase	8–16		
Paxton loam	0– 8		
Sloping phase	8–16		
Group 6—Stone-cleared level to sloping well-drained deep soils on loose to firm till:			
Charlton gravelly fine sandy loam	3– 8	Corn, peas, beans, oats, hay, potatoes, truck crops, and small fruits; well suited to orchards except where a compact layer occurs at shallow depth.	Row, row, and gree (or row and gr nure) on the m areas; row, grai to 3 years of ha steeper slopes.
Rolling phase	8–15		
Charlton loam	3– 8		
Sloping phase	8–15		
Colrain loam	0– 8		
Rolling phase	8–15		
Hermon fine sandy loam	3– 8		
Sloping phase	8–16		

See footnote at end of table.

TABLE 5.—*Suitable uses, rotations, and supplemental practices for agricultural soils*

Soil group	Dominant slope	Uses	Rotations
Group 7—Stone-cleared well-drained level to sloping shallow soils:			
Canaan loam	0– 8	Truck crops, hay, beans, peas, corn, oats, small fruits; few good orchards or potatoes.	Row, grain, and g nure or hay on gently sloping ar grain, and 1 to 4 hay on strongly areas.
Sloping phase	8–15		
Hinsdale gravelly sandy loam, rolling phase.	8–16		
Hollis gravelly loam	0– 8		
Sloping phase	8–16		
Hollis loam	0– 8		
Sloping phase	8–16		
Shapleigh loam	0– 8		
Sloping phase	8–16		
Thorndike gravelly silt loam	0– 8		
Rolling phase	8–16		
Thorndike silt loam	0– 8		
Moderately eroded phase	3– 8		
Sloping phase	8–15		
Group 8—Stone-cleared imperfectly drained soils of uplands:			
Acton loam	0– 8	Pasture and hay; some corn and oats; no orchards.	Row, grain, and years of hay or permanent sod.
Sloping phase	8–16		
Dixmont loam	0– 8		
Sloping phase	8–16		
Sutton loam	0– 8		
Sloping phase	8–16		
Group 9—Imperfectly drained sandy soils of smooth outwash, stream terraces, and flood plains:			
Alluvial soils, undifferentiated	0– 3	Mostly pasture or hay	None; maintenanc or pasture.
Podunk fine sandy loam	0– 3		
Sudbury fine sandy loam	0– 3		

Group 10—Stone-cleared eroded and steep soils on deep till:			
Bangor gravelly silt loam:			
Eroded sloping phase	8–16		
Steep phase	20–30		
Bangor silt loam, steep phase	20–30		
Charlton loam:			
Eroded sloping phase	8–16		
Eroded steep phase	20–30	Hay, oats, corn, orchards; some potatoes, beans, and peas; suited to small fruits and pasture.	Row, grain, and 1 of hay; long-ter pasture.
Steep phase	20–30		
Colrain loam, steep phase	20–35		
Hermon fine sandy loam:			
Eroded sloping phase	8–16		
Steep phase	20–45		
Paxton loam:			
Eroded sloping phase	8–16		
Eroded steep phase	20–30		
Steep phase	20–30		
Group 11—Stone-cleared eroded and steep soils on shallow till or ledge land:			
Canaan loam, steep phase	20–30		
Hollis loam:			
Eroded sloping phase	8–16		
Eroded steep phase	20–30		
Steep phase	20–30	Hay, pasture, oats, orchards, small fruits, and ornamentals; some beans and peas.	Row, grain, and 2 of hay or pastu term hay or past
Shapleigh loam, steep phase	20–30		
Thorndike gravelly silt loam, hilly phase.	15–30		
Thorndike silt loam:			
Eroded hilly phase	20–30		
Eroded sloping phase	8–16		
Hilly phase	15–30		

See footnote at end of table.

TABLE 5.—*Suitable uses, rotations, and suplemental practices for agricultural soil*

Soil group	Dominant slope	Uses	Rotations
Group 12—Stone-cleared poorly drained soils of uplands:			
Burnham silt loam	0– 3	Predominantly pasture and hay.	None; maintens hay and pasture.
Whitman loam	0– 3		
Group 13—Stone-free imperfectly and poorly drained fine-textured soils:			
Biddeford silt loam	0– 3	Predominantly pasture and hay.	None; maintenanc and pasture.
Buxton silt loam	0– 3		
Saco silt loam	0– 2		
Saco silty clay loam	0– 2		
Group 14—Poorly drained soils on smooth glacial outwash, stream terraces, and flood plains:			
Rumney loam	0– 2	Predominantly pasture and hay.	None; maintenanc and pasture.
Scarboro fine sandy loam	0– 2		

[1] Row refers to intertilled crops such as corn, beans, or potatoes. Green manure crops includ grass or peas in which clover is sown for green manure.

Much of the cropland of Waldo County is used for hay, the major crop. Hay is suitable for the stone-cleared imperfectly drained to well-drained upland soils, some of the stone-free heavier soils of the terraces, and Podunk fine sandy loam of the bottom lands. Hay ordinarily does not grow well on the very sandy or gravelly porous soils or on thin ledge land, but exceptions are the Thorndike soils on which hay grows very well. Also suited to hay and used for its production are soils of the Buxton series and the Suffield and Hartland silt loams.

Hay mixtures should be varied according to the soils. Ladino and red clover, timothy, smooth brome, and alfalfa are suitable on most soils of the upland; reed canary, redtop, alsike, and ladino clover are best on wet areas; and orchard grass may be included in seeding mixtures to insure good stands on shallow or very sandy soils. Grasses require fairly good soils for high yields, and hay is therefore best grown in rotation. Manure has customarily been applied to tilled fields rather than to meadows, but demonstrations have shown that applying manure to meadows is profitable. Stands of hay have been markedly improved by topdressing with 4 to 5 tons or more of manure and 300 to 400 pounds of superphosphate or about 600 pounds of 5–10–10 or 0–20–20, and sufficient lime, depending on the acidity of the soils, to bring the soil pH to 5.5 to 6.5. This may require 1 to 3 tons of ground limestone per acre.

Haying customarily begins early in July and may continue into August. As a result, much clover, timothy, and alfalfa hay is cut long after the bloom stage; this is, after the time when it is highest in digestible nutrients and best for feed. Some farmers of the county report an increased yield of as much as 500 pounds an acre by later cutting, but it has been shown that such a practice may result in a loss in dry matter and digestible nutrients. The highest yields of hay per acre will usually be obtained when the crop is cut not later than the full-bloom stage.

Improved or rotated pastures are now mostly on the stone-free, clay-derived, imperfectly drained soils. Soil of the Sutton, Sudbury, and Buxton series, the Suffield and Hartland silt loams, and if not too wet, the Biddeford soils, are good for pasture. The practice of growing hay and pasture in rotation with tilled crops is increasing.

Pastures, like hay land, require fertilization, as animal droppings do not furnish enough plant nutrients. Many of the pastures in the county have not been improved since the timber was cut and may contain stones, stumps, and marshy spots that make good management difficult. Some pastures are so stony or wet they are not worth improvement and should be returned to timber. Where feasible, stones and stumps may be removed from pasture and marshy spots drained to permit liming and fertilization. The cost of clearing, however, may be more than the value of the cleared soil. Reseeding of pastures along with fertilization usually results in improved forage. A good mixture for seeding well-drained land is 7 pounds of timothy, 6 pounds of red clover, 2 pounds of redtop, and 1 pound of ladino clover. A mixture of 6 pounds of reed canarygrass, and 4 pounds of alsike clover or 2 pounds of ladino clover is appropriate for wet land.

Management for the various intertilled and grain crops differs considerably, and no particular rotation is used. In more level areas intertilled and grain crops are rotated with hay. The soil is seeded in the fall to grass after harvesting a row crop, or the following spring to oats and clover. Oats used as a companion crop are usually harvested for grain but are sometimes grazed or cut for hay. After the oats are removed, the sod is left as long as good yields are obtained. More progressive farmers plow the hay under the fourth and fifth year and complete the rotation with a clean-tilled crop, such as corn, beans, peas, or potatoes.

Fertilizers are applied for potatoes, beans, peas, and corn. Oats are usually not fertilized; they benefit from the residue of applications made to the clean-tilled crops. Lime is not applied in sufficient quantity for legume crops. Some farmers use 1,000 pounds or more per acre on their fields at least once in 3- to 5-year rotation. Low pH values (table 8) indicate the need of most of the soils for lime. Lime is most beneficial when applied at time of seeding hay and pasture crops.

Manure is applied to many crops; the quantity used per acre depends on the supply farmers have available. Heavier applications of manure are used for corn, peas, and beans, and smaller ones for orchard and hay crops. Under general cropping practices sweet corn, peas, and beans receive from 15 to 30 tons per acre.

Intertilled crops such as corn, peas, beans, and other vegetables for canning, and potatoes are grown extensively in the northwestern part of the county. Management varies considerably according to the crop. For corn and beans, management is much alike. Fertilizer is usually drilled in row side bands at the time they are planted. The planters should place the fertilizer a little to one side and slightly below the level of the seed. When corn is knee-high, a side dressing of nitrogen fertilizer is usually applied. It is generally assumed that clay soils need more fertilizer than loams or sandy soils for best results. On soil receiving 10 to 15 tons of manure, 700 to 800 pounds of 4–12–8 or 4–12–4, or equivalent quantities of plant nutrients in other analyses, are recommended for corn. On soil where no manure is applied, 1,000 pounds of 5–10–10 should be used. An additional 20 to 40 pounds of nitrogen (N) applied as a side dressing when the crop is knee-high may be profitable. About the same quantities of fertilizer are recommended for snap beans. The nitrogen side dressing should be applied when the beans are in the blossom stage.

Peas for processing are drilled from May 1 to 15 and harvested July 15 to 30. Fertilizer is usually applied broadcast with lime distributors and worked into the soil before peas are planted. On soils high in fertility, only a nitrogen fertilizer to supply 30 to 50 pounds of nitrogen (N) an acre is recommended. On soils lower in fertility, 500 to 700 pounds of 4–12–8 an acre with manure, or 800 to 1,000 pounds of 5–10–10 without manure, is recommended. Except on potato soils, sufficient lime should be applied to bring the soil pH to 5.8 to 6.5. Where peas are grown in rotation with potatoes, drilling 300 to 400 pounds of finely ground dolomitic limestone an acre with the pea seed is usually very profitable.

Potatoes are planted from May 25 to June 12 and harvested between September 15 and October 15. Recommended depths for planting are about 3 inches on fine-textured soils and 4 inches on sandy soils.

Liming materials should generally be applied in quantities of not more than 1,000 pounds of finely ground dolomitic limestone on sandy soils and 2,000 pounds per acre on loams or silt loams because of the possibility of development of potato scab. The soil pH should be checked before each application. In general the pH level should not exceed 5.0 for sandy soils and 5.3 to 5.4 for loams and silt loams. Fertilizer should be applied in amount to furnish 100 to 120 pounds of nitrogen (N), 160 to 200 pounds phosphoric acid (P_2O_5), and 160 to 200 pounds of potash (K_2O). Recommended quantities of fertilizer to be applied in row side bands at planting are 2,000 pounds of 5–10–10 or 6–9–9 or 1,250 to 1,500 pounds of 8–16–16, 8–12–16, or 8–12–12 per acre. The particular quantities and analyses recommended depend upon the previous crop and level of available plant nutrients in the soil.

Apples, the principal orchard crop, are exacting in soil and moisture requirements and in topographic location. Orchard plantings are frequently made on unsuitable soils and in sites where winterkilling or frosts reduce yields. Sites with good air drainage on soils well-drained both externally and internally must be chosen. Plantings should not be made on hill slopes having seepy areas and depressions, as for example, on poorly drained Sutton and Whitman soils. Heavy clay-derived soils, as the Suffield and Hartland, should be avoided. Soils with hard compact subsoil, as the Paxton and some of the Bangor soils, can be used only where the surface soil is loamy and deep enough to mitigate the adverse effect of compact subsoil. The sloping phases of Hollis gravelly loam or Hollis loam are good for orchards, but most ledge land is ill-suited.

Recommended soil management practices include: (1) Maintenance under trees of a hay or straw mulch deep enough to smother out most weeds and grasses; (2) annual application under the spread of the branches of ⅓ pound of nitrate of soda (or its nitrogen equivalent) per year of tree age; (3) annual application of 500 to 700 pounds of 7–7–7 between the rows to stimulate sod, and if manure is available, top-dressing with manure and superphosphate is recommended; (4) application of ground dolomitic limestone to the entire orchard whenever the need is indicated by soil tests. The grass in orchards is cut to form a mulch under the trees, and therefore little of the fertilizer added is lost. The trees eventually get all the fertilizer that does not leach away. Under this method McIntosh apples frequently yield 300 bushels an acre. In addition to other good management practices, apples require several applications of spray yearly.

Garden vegetables and small fruits are usually grown from year to year on the same piece of ground. As a result heavy applications of fertilizer are profitable if sufficient manure is not available. The cane fruits—black and red raspberries, dewberries, and blackberries—usually are not fertilized under current practices, but where poultry is allowed to range the plantings, droppings increase yields and weed growth is reduced. Strawberries may receive commercial fertilizer.

Though blueberries are native and grow on waste land, they require some management if best yields and quality are to be obtained. Generally, the patches are mowed and burned at 2- or 3-year intervals. Not all patches are burned the same year, about one-third of them in yearly rotation. Burning is essentially a pruning practice, and at the

same time tends to keep weeds under control. In addition, the burning and removal of bushes and trees by grubbing encourages new plants, since competing trees and brush are removed. Dusting to control insect pests and fungus and other diseases is almost universally practiced.

Special management practices for improvement of drainage and control of erosion do not warrant detailed discussion, as they are not widely required. Clay-derived soils and those underlain by compact till present drainage problems, but most soils of the county are well drained. The most serious need for drainage occurs in orchards where imperfectly and poorly drained depressional areas of Sutton, Dixmont, Acton, Whitman, and Burnham soils occur. Planting of orchards should be avoided in such areas unless artificial drainage can be established. Tile drains can be installed just below the general root level, or ditches may be effective and feasible if they do not entail too many bridges and culverts. Covered tile drains are convenient when spraying and harvesting equipment are used.

Erosion is most serious on the acreage of clay-derived soils under cultivation. This is only about 20 percent of the total acreage of these soils, as they are used mainly for pasture or more or less permanent hay. Erosion is not severe on the cultivated areas of clay-derived soils where the slopes are 6 percent or less but may be serious on steeper slopes. Contour strip cropping, long rotations, and, in rare instances, diversion ditches are needed on cultivated clay-derived soils. In small irregular areas, however, complex erosion control practices are not always feasible.

PRODUCTIVITY

The productivity of soils in the county varies considerably. Crop yields are relatively high in some areas, particularly on Bangor soils around Unity and Knox Ridge, and near the villages of North Palermo, Morrill, and Thorndike, where Charlton, Thorndike, and related soils have been well maintained. All principal crops except apples yield consistently higher in the areas just mentioned than in other parts of the county. Apples are most productive on Bangor, Hermon, and Etna-Hartland soils in the towns of Winterport and Swanville.

Crop yields are a measure of soil productivity, and table 6 is included to facilitate comparison of soils. This table gives estimated average acre yields of principal crops according to two levels of management. In columns A are listed yields expected under ordinary management, which includes use of some lime and fertilizer; and in columns B are expected yields under better management, or that including use of good rotations containing green-manure crops where necessary, judicious use of fertilizer and lime, and use of artificial drainage where necessary and feasible.

For most cultivated crops, yields in table 6 are based on reports from farms where fields included several soil types and phases, and it was necessary to estimate how much of the total yield came from each type or phase. The average yields thus obtained were then checked with the county agricultural agent, and against averages based on census figures.

Though yields are listed in the table for some stony and steep soils, this does not indicate the soils are now cultivated. The figures listed

are estimates of potential yields if the soils were cleared and used for crops. For such soils, yields are estimated only for the crops apparently best adapted. Estimates of potential yields were not made for rough and stony soils definitely unsuited to cultivation, as for example, those of the Hinsdale series, which now support good stands of oak and pine timber.

Because most improved pastures in the county are also used as hay land, the carrying capacity of the pastures for livestock is more or less directly proportional to hay yields. The best pastures carry one or two cows an acre from May to October without difficulty, but unimproved pastures on idle cropland, brushy tracts, or woodland carry one cow on 2 to 4 acres most of the spring and summer, or for about 160 to 180 days. In considering hay yields, it is pertinent that higher production is not always evidence of good management. Mowing clover and such hay late in the season may result in increased yields; but cutting in the bloom stage is better management, because it increases feed value even though the tonnage is less.

The estimated yields for apples given for the more level to gently sloping soils are less reliable than those for more sloping soils. In low areas there may not be air drainage to lessen the danger of frost injury. Small fruits (dewberries, raspberries, strawberries, and blueberries) and vegetables are grown in the county, but yields are not estimated because adequate data are lacking.

Yields like those given in columns B of table 6 are seldom achieved because few farmers follow the management practices required to obtain them. There are differences, of course, in the response of soils to better management. For some soils the yields in columns A and B are little different because the soils do not respond to better management. On others, differences of yield are much greater because better management overcomes serious soil deficiencies.

FORESTS

Forests in Waldo County have the general composition common to the northern forest region. Both conifers and hardwoods are represented. Eastern white pine, Eastern hemlock, beech, basswood, red and white spruces, Northern red, white, and scarlet oaks, red and sugar maples, and gray, paper, and yellow birches are among the important species. A great part of the area is covered by a beech-birch-maple-fir-hemlock association.

The forested soil ranges from level well-drained sandy plains and saturated swamp to steep and precipitous mountain slopes. To some extent the soils determine the kinds of trees. In general, upland soils developed on till support northeastern hardwoods mixed with pine, spruce, fir, and hemlock, whereas shallow soils at high elevations and those on sandy outwash are dominantly covered by conifers. More specifically, five distinct soil associations are evident in the primarily forested areas. These soil associations are as follows:

1. Well-drained rolling to hilly stony soils on deep till.
2. Nearly level soils on sandy outwash.
3. Soils on mountainous areas and rough stony land having many ledge outcrops.
4. Nearly level to sloping imperfectly and poorly drained soils.
5. Steeply rolling or sloping droughty excessively drained gravelly cobbly soils on rough glacial outwash or morainic deposits.

TABLE 6.—*Estimated average acre yields* [1] *of the principal crops on soils of Waldo County, Main*
approximate percentage of each soil in cropland, orchard, hay or pastur

[In columns A—yields under ordinary management, which includes use of some fertilizer and lime; in columns B—yields un
rotations containing green-manure crops when necessary, judicious use of fertilizer and lime, and use of artificial

Soil	Corn						Beans				Peas (canning)		Oats (grain)		Potatoes		Hay (clo and timoth	
	Sweet		Silage		Field		Dry		Canning									
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	
	Tons	*Tons*	*Tons*	*Tons*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*T*
Acton loam	6.0	8.0	10.0	12.0	25	35							30	40	180	220	1.00	2.
Sloping phase	6.0	8.0	8.0	10.0	25	35							30	40	200	250	1.50	2.
Acton stony loam																		
Sloping phase																		
Adams fine sandy loam	5.0	7.0	12.0	15.0			22	25	1.5	2.0			40	50	220	280	1.50	1.
Adams loamy fine sand	2.0	6.0	5.0	7.0	15	30	8	15	1.0	1.5			20	30	150	225	.75	1.
Steep phase																		
Agawam loamy very fine sand	5.0	7.0	10.0	15.0	20	35	15	30	2.0	3.0	2.0	2.5	30	40	200	300	1.00	2.
Alluvial soils, undifferentiated																		
Balch peat																		
Bangor gravelly silt loam	5.0	7.0	12.0	15.0			23	28					40	55	225	300	1.25	1.
Sloping phase	4.0	6.0	8.0	12.0			18	22					35	50	200	275	1.00	1.
Eroded sloping phase	4.0	6.0	8.0	10.0			15	18					30	50	200	250	.75	1.
Steep phase																	.75	1.
Bangor silt loam	6.0	10.0	12.0	18.0	45	60	25	30	2.0	3.0	2.5	3.0	50	65	245	350	1.50	2.
Moderately eroded phase	5.0	7.0	10.0	15.0	40	50	20	25					40	60	225	300	1.25	1.
Sloping phase	5.0	7.0	10.0	15.0	40	50	20	25					40	50	250	300	1.00	1.
Steep phase	4.0	6.0	8.0	10.0			15	18					30	40	200	250	1.00	1.
Bangor stony silt loam																		
Smooth phase																		
Steep phase																		
Bangor-Hartland stony complex																		
Biddeford silt loam																		
Burnham silt loam																		

Burnham stony silt loam																		
Buxton silt loam	2.0	4.0	9.0	13.0									15	40	100	150	1.50	1.
Buxton-Biddeford stony silty clay loams																		
Canaan loam			5.0	7.0	15	25							20	30	175	250	.75	1.
Sloping phase			4.0	6.0	10	20							10	25	125	200	.50	1.
Steep phase			3.0	5.0	10	15							10	20	50	100	.25	.
Canaan stony loam																		
Canaan very stony loam																		
Hilly phase																		
Charlton gravelly fine sandy loam			8.0	10.0	30	45	15	25					35	50	250	300	1.00	2.
Rolling phase			7.0	9.0	25	35	12	20					25	35	190	250	1.00	1.
Charlton loam	6.0	8.0	11.0	15.0	40	50	25	35			2.5	3.0	40	50	275	350	1.25	1.
Sloping phase	6.0	8.0	9.0	12.0	30	40	22	25					35	45	220	300	1.00	1.
Eroded sloping phase	4.5	6.0	7.0	10.0	25	35							25	45	220	275	.50	1.
Steep phase			5.0	7.0	20	30	10	15					25	30	100	150	.75	1.
Eroded steep phase			4.0	6.0	10	20	8	12					15	25			.50	1.
Charlton stony loam																		
Undulating phase																		
Steep phase																		
Coastal beach																		
Colrain loam	3.5	6.0	7.0	10.0	35	50	20	30					40	50	200	250	1.00	1.
Rolling phase	3.0	5.0	6.0	8.0	30	40	15	20					30	45	200	250	1.00	1.
Steep phase			4.0	6.0	15	25	10	15					20	30	100	150	.75	1.
Colrain stony loam																		
Undulating phase																		
Steep phase																		
Dixmont loam	4.0	6.0	12.0	15.0									35	45	200	225	1.75	2.
Sloping phase	3.0	5.0	10.0	15.0									30	40	150	200	1.00	1.
Dixmont stony loam																		
Sloping phase																		
Etna fine sandy loam	4.0	6.0	7.0	10.0									25	40	200	250	.75	1.
Etna loamy sand			3.0	5.0	10	20									100	150	.25	.
Hilly phase																		
Etna gravelly sandy loam			6.0	8.0	20	30	10	15					15	30	150	200	.50	1.
Hilly phase																		
Etna-Hartland very fine sandy loams	4.0	8.0	9.0	12.0			15	20			2.0	3.0	30	40	200	275	.50	1.
Eroded phases	3.0	5.0	8.0	11.0			10	16			2.0	3.0	25	35	150	200	.25	1.
Hilly phases																	.25	1.
Eroded hilly phases	2.0	4.0	5.0	8.0			8	15	2.0	3.0	2.0	3.0	10	25			.50	1.

See footnotes at end of table.

TABLE 6.—*Estimated average acre yields*[1] *of the principal crops on soils of Waldo County, Mai*
approximate percentage of each soil in cropland, orchard, hay or pasture, and

Soil	Corn						Beans				Peas (canning)		Oats (grain)		Potatoes		Hay (clo and timoth	
	Sweet		Silage		Field		Dry		Canning									
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	
	Tons	*Tons*	*Tons*	*Tons*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*T*
Greenwood peat																		
Hartland fine sandy loam	4.0	6.0	10.0	15.0	40	50	15	20					25	40	150	200	1.00	2.
Severely eroded phase	3.0	5.0	5.0	12.0	20	35	10	18					25	40	140	175		
Steep phase																		
Severely eroded steep phase	2.0	3.0	5.0	8.0	10	20	8	12					20	35			1.00	1.
Hartland silt loam			8.0	10.0	30	40							30	45			1.25	2.
Eroded phase			6.0	10.0	20	40							15	40			1.00	1.
Steep phase					10	20											1.00	1.
Severely eroded steep phase													15	30			.50	1.
Hermon fine sandy loam			6.5	7.5	30	40							30	50	200	275	1.00	1.
Sloping phase			6.0	7.0	30	40	10	15					30	40	175	200	1.00	1.
Eroded sloping phase			6.0	7.0	20	40	8	15					20	40	150	200		
Steep phase					10	20							20	30	100	130		
Hermon stony fine sandy loam																		
Undulating phase																		
Hermon very stony fine sandy loam																		
Hinsdale gravelly sandy loam, rolling phase			4.0	6.0	15	30	10	20					20	30	175	250	.50	1.
Hinsdale stony sandy loam																		
Hilly phase																		
Hollis gravelly loam			5.0	7.0	10	20	6	15					15	25	175	240	.25	1.
Sloping phase			5.0	6.0	10	20	4	10					10	25	50	225	.25	1.
Hollis loam	3.0	5.0	8.0	10.0	15	25							30	40	200	250	.50	1.
Sloping phase	4.0	6.0	6.0	8.0	15	25	10	18					15	25	175	225	.50	1.

Eroded sloping phase	2.0	3.0	5.0	6.0	10	20	5	12					12	20	100	200		
Steep phase			4.0	5.0	10	20	4	10					10	15	75	150	.25	
Eroded steep phase			3.0	5.0	5	15	4	10					10	15	50	100		
Hollis stony loam																		
Littlefield peat																		
Melrose fine sandy loam	5.0	8.0	10.0	15.0	45	60	25	35	2.5	3.5	2.5	4.0	45	60	250	300	1.50	2
Undulating phase	4.0	7.0	10.0	15.0	40	50	25	35	2.0	3.0	2.0	3.5	35	50	250	300	1.50	2
Ondawa fine sandy loam	5.0	10.0	10.0	15.0	45	60	18	25					30	40	220	275	1.75	2
Paxton loam	5.0	8.0	12.0	13.0	40	55	12	20	2.0	3.0	2.0	2.5	40	50	220	275	1.50	2
Sloping phase	4.0	6.0	8.0	12.0	23	45	15	18					35	45	180	230	1.00	1
Eroded sloping phase	3.0	5.0	7.0	10.0									20	30	50	200	.50	1
Steep phase			5.0	7.0	15	25	8	15					20	30	100	150	.50	1
Eroded steep phase			4.0	7.0	10	25	8	15					15	30	100	150	.25	1
Paxton stony loam																		
Undulating phase																		
Steep phase																		
Podunk fine sandy loam			6.0	10.0	25	40	15	20					25	40	50	200	1.00	1
Rock outcrop [5]																		
Rough stony land:																		
Canaan soil material																		
Paxton soil material																		
Thorndike soil material																		
Westford soil material																		
Rumney loam																		
Saco silt loam																		
Saco silty clay loam																		
Scarboro fine sandy loam																		
Shapleigh loam			6.0	8.0	15	30	10	20					20	30	175	250	1.00	1
Sloping phase			5.0	7.0	15	25	5	15					10	25	150	200	.50	1
Steep phase																		
Stetson fine sandy loam	4.0	6.0	8.0	13.0	40	50	18	20					38	45	200	250	1.25	1
Stetson loamy sand			6.0	8.0	15	25	6	12					15	30	150	225	.75	1
Stetson gravelly sandy loam			5.0	7.0	15	30	6	10					15	25	150	225		
Steep phase																		
Stetson-Suffield very fine sandy loams	4.0	6.0	10.0	15.0									35	45	175	225	1.25	1

See footnotes at end of table.

TABLE 6.—*Estimated average acre yields*[1] *of the principal crops on soils of Waldo County, Mai*
approximate percentage of each soil in cropland, orchard, hay or pasture, and

Soil	Corn						Beans				Peas (canning)		Oats (grain)		Potatoes		Hay (clo and timoth	
	Sweet		Silage		Field		Dry		Canning									
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	
	Tons	*Tons*	*Tons*	*Tons*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*T*
Sudbury fine sandy loam																	1.25	1.
Suffield fine sandy loam	6.0	10.0	12.0	15.0	40	60	22	25	2.0	3.0	2.0	2.5	40	60	200	250	2.00	2.
Eroded phase	4.0	8.0	8.0	12.0	30	50	15	25	1.5	3.0	1.0	2.5	30	50			1.00	2.
Suffield silt loam	5.0	7.0	10.0	15.0			12	20					25	35	25	200	1.50	2.
Eroded phase	4.0	6.0	8.0	12.0			10	18					20	35			1.00	1.
Severely eroded phase	3.0	5.0	6.0	10.0			8	15					15	30			.50	1.
Sutton loam	4.0	6.0	10.0	15.0	25	35	10	20					20	35	200	225	1.50	2.
Sloping phase	3.0	5.0	7.0	9.0	20	30	10	20					20	35	180	225	1.00	1.
Sutton stony loam																		
Sloping phase																		
Shallow phase																		
Sutton very stony loam																		
Thorndike gravelly silt loam	4.0	6.0	10.0	12.0	40	50	15	20	1.75	2.50	1.5	2.0	25	34	200	275	.50	1.
Rolling phase	3.0	5.0	8.0	10.0									20	30	150	200	.50	1.
Hilly phase																	.50	1.
Thorndike silt loam	6.0	8.0	10.0	15.0	50	60	18	22	2.00	2.50	2.0	3.0	35	45	220	275	1.50	2.
Moderately eroded phase	3.0	5.0	8.0	12.0	50	60	15	20			2.0	3.0	25	35	225	250	.75	1.
Sloping phase	2.5	4.0	8.0	12.0	30	40	15	20	2.00	2.50	2.0	2.5	15	30	175	225		
Eroded sloping phase	2.0	3.0	8.0	10.0	25	35	15	30	2.00	2.50	1.75	2.0	20	34	150	225	.50	1.
Hilly phase			6.0	18.0	15	25	10	15					15	25			.50	
Eroded hilly phase			5.0	7.0	15	20	8	15					15	20			.25	
Thorndike stony silt loam																		
Hilly phase																		
Waterboro muck																		

Westford stony loam																				
Westford very stony loam																				
Whitman loam																				
Whitman stony loam																				
Whitman very stony loam																				

[1] Yield estimates derived from data in Summary of Farm Studies, Maine Agr. Expt. Sta. Bul. 417, 1943, by A. E. Watson; from crop records of the Bureau of Agricultural Economics and the Agricultural Adjustment Administration (Now PMA) of the U. S. Department of Agriculture; and from estimates based on observations of the soil survey field party. Where yield data are not given ,the crop is not grown or data were not available.

[2] Cow-acre-days, used to express
of animal units carried per acre m
grazed without injury to pasture;
acre for 360 days rates 360; a soil su
and a soil supporting 1 animal unit

[3] Sphagnum moss. [4] Heath an

In association 1 are the schist- and gneiss-derived Paxton and Charlton soils supporting Northern red oak, maple, birch, ash, elm, beech, and some pine; and the Hermon soils of granitic origin, on which grow much more spruce, fir, and hemlock than hardwoods. As a whole the association favors hardwood growth and contains most of the valuable timber in the county.

Soil association 2 is covered mostly with white and red pines, though some birch, aspen, and scrub oak are admixed. The small sand plains in Monroe, Liberty, and Searsmont towns once supported magnificent stands of white pine and spruce. Measurements of growth rings indicate these trees grew rather rapidly. These areas of dry sandy soils deficient in essential plant nutrients have been cut over and burned over frequently, especially where used for blueberries and, though never tilled, are becoming unproductive of either timber or crops.

Association 3 has varied forest growth. On the shallow areas or ledge land occur Canaan and Shapleigh soils chiefly of granitic origin. On these dwarf juniper dominates, though there is a poor growth of pine, maple, aspen, and gray birch. The schistose Hollis and syenitic Hinsdale soils generally have a good growth of red and white oaks, white pine, and hemlock, but where the Hollis are very thin or ledgy, ground juniper predominates. The Westford soils of this association support mainly spruce, birch, maple, and aspen.

Association 4 has forest growth as follows: (1) Soils derived from till—birch, alder, elm, spruce, fir, and hemlock; (2) organic soils—black spruce, Northern white cedar, fir, larch, and an understory of heath; (3) outwash-terrace soils and bottom lands—hemlock, white pine, spruce, fir, larch, and willow.

Soils of association 5 support a thin growth, primarily of pine and aspen with a dense bracken and blueberry understory.

Over 75 percent of the county is forested or in pastures rapidly becoming forested. Wooded tracts and continuous bands of timber occur throughout the area. Thorndike, Unity, and a few other towns are over 35 percent cleared and have less forest than the rest. All forests have been cut over, but a few stands of hemlock, spruce, fir, pine, and like trees of saw timber size still remain in isolated places where selective cutting has been practiced. For the most part, however, forests contain little marketable timber and may remain relatively unproductive unless lumbering practices are improved.

Lumbering is carried on almost entirely by owners of portable and small local mills. Stumpage rights include all trees down to 2 or 3 inches in diameter, and little effort is made to spare growth below stumpage size. Many of the saplings are broken in removing sawlogs, pulpwood, or cordwood, now the principal forest products. Such lumbering methods do not leave enough seed trees to propagate desirable species or leave a thrifty young growth.

The importance of forest to the county is indicated by the great area in woodland. Future income from this acreage will be mainly from forest products, and careful management is therefore important. Through misuse, the small dry plains of sandy soils, the thin soils of mountainous areas, and other poor soils of the county are becoming unproductive of either forest or crops. They present a problem in use but, wherever feasible, it is probably better to establish pine forest

rather than blueberries. This applies particularly to the sand plains, as tree growth on them is rapid. On mountain ledge lands where tree growth is slow, blueberries may be as suitable as trees. Some of the poor timberland, as around Bald Rock and Frye Mountains, is useful only as recreational sites. The areas having timber now reaching marketable size require careful selective cutting and rotation to prevent their becoming wasteland.

Some fire control is exercised. Fire towers are on Bald Rock and Frye Mountains, but a method of reporting that would assist a few wardens in keeping fire out of young stands of pine would be valuable. The greatest need for fire control is in sparsely settled tracts, as woodlands in farmed areas are blocked out and protected by fields and pastures. Forests have been injured to some extent by fires, and repeated burning has kept large areas in little other than blueberry bushes, dwarf juniper, and scrub oak.

MORPHOLOGY AND GENESIS OF SOILS

Soil is the product of the forces of weathering and soil development acting on the parent material deposited or accumulated by geologic agencies. The characteristics of the soil at any given point depend on (1) the physical and mineralogical composition of the parent soil material; (2) the climate under which the soil material has accumulated and has existed since accumulation; (3) the plant and animal life in and on the soil; (4) the relief, or lay of the land; and (5) the length of time the forces of development have acted on the material. The influence of climate on soils and plants depends not only on temperature, rainfall, and humidity but also on the physical characteristics of the soil or soil material and on the relief which, in turn, strongly influences drainage, aeration, runoff, erosion, and exposure to sun and wind.

Waldo County is in the glaciated section of New England. When the glaciers moved over the county they scoured the rock material from most of the very high mountains and deposited it in the valleys. In addition, they brought material in from other areas over which they passed. The material from outside areas was mixed with the local rock, and the glacial till of the county is therefore usually derived from a heterogenous mixture of schist, gneiss, phyllite, granite, quartzite, slate, and other rock. Some of the till in the western and northwestern parts of the county is slightly calcareous and contains more fine slaty material than elsewhere. In some places, also, local material influences the heterogenous till to a greater extent. For example, there are areas predominantly of granitic material, such as the one around Mount Waldo, and other areas mostly of schist, as around Coon Mountain near Liberty.

The bedrock under the glacial till is mainly of four distinct kinds occurring in rather definite parts of the county. Granite bedrock is restricted to the Mount Waldo area and one or two other areas on nearby knobs. Bedrock of micaceous gneiss or schist is widespread over most of the eastern, southern, and central parts of the county. Predominant in the northwestern and central-northern parts is bedrock of interbedded phyllite, quartzite, slate, acid and calcareous schist, and metamorphosed siliceous limestone. Syenite bedrock is

dominant only in the very small area near South Liberty along the county line.

The climate is continental over most of the county but areas along the coast are influenced by winds from Penobscot Bay. Total yearly precipitation averages 39.69 inches for the coastal and low-altitude areas, and yearly snowfall for these same areas averages 75.7 inches. Winters are rather long and severe. Summers are generally cool, although there are infrequent short hot spells. Although summers are somewhat dry, enough rain usually falls to prevent drought conditions on all except the very porous soils.

Vegetation varies according to the soils. The county is entirely in the northern forest region, and the growth includes both deciduous and coniferous trees. Generally the upland soils developed on till support forest stands in which northeastern hardwoods and conifers are about equally mixed. On these soils Northern red, white, and scarlet oaks, gray, yellow, and paper birches, ash, beech, basswood, and maple are mixed with pine, spruce, fir, and hemlock. In contrast, the shallow soils at high elevation and those developed on sandy outwash support conifers predominantly.

The topography of the county varies from small, nearly level, outwash plains and clay basins to large strongly rolling and hilly glacier-smoothed mountains and till ridges. Nearly level, poorly drained swamps are extensive in the northwestern part. Many small postglacial streams and rivers provide good drainage for most soils of the county.

The great soil group and the relationships between parent material and drainage for the soil series of Waldo County, Maine, are given in table 7.

Waldo County is in the transitional zone between Podzol and Brown Podzolic soil regions. Most of the soils are derived from acid or neutral parent material under a cool humid climate and coniferous or mixed hardwood and coniferous forest. The textures are nearly all silt loams, sandy loams, or loams containing considerable coarse sand. In well podzolized and undisturbed woodland areas, the succession of horizons with increasing depth is about as follows:

- A_{00} Loose leaves and forest litter about 3 inches thick.
- A_0 Black well-rotted organic material approximately 2 inches thick.
- A_1 Black mineral and organic material about 2 inches thick.
- A_2 Ashy-gray leached horizon 2 to 3 inches thick that abruptly replaces the horizon above.
- B Brown, yellow, and gray horizons from granite or brown and olive material.

The ashy-gray A_2 horizon indicates that percolating waters have leached iron or alumina, or both, to lower levels. This gray horizon is more pronounced in soils from granitic materials than it is in those from the schistose. It is usually very thin to absent in the soils developed from limy materials or from silts and clays. The gray color is more evident in soils on hills and mountains with elevations of 800 to 1,200 feet than it is in soils at lower altitudes. In the decidedly sandy soils, however, the gray horizon may be 4 inches thick, regardless of elevation.

TABLE 7.—*The great soil group and the relationships between parent material and d*
County, Maine

[The capital letters in parentheses following the series names B-Bog; indicate the great soil grou
Half Bog; A-Alluvial]

Parent material	Drainage		
	Excessive	Good	Im
Till from interbedded hard gray shale or slate and siliceous limestone.	Thorndike (BP)	Bangor (BP)	Dixmo
Till from interbedded phyllite or schist and siliceous limestone.		Colrain (BP)	
Till from gray mica schist	Hollis (BP)	Charlton (BP)	Sutton
Do	Westford (BP)	Paxton (BP)	
Till from granite or gneiss	Canaan (PO)	Hermon (PO)	Acton
Do	Shapleigh (BP)		
Till from syenite	Hinsdale (BP)		
Outwash from interbedded phyllite, shale or slate, and siliceous limestone.	Etna (PO)	Stetson (PO)	Sudbur
Stream terrace material largely from granite, gneiss, or schist.		Agawam (BP)	
Sandy deltaic deposits	Adams (PO)		
Sandy deposits over marine silts and clays.		Melrose (BP)	
Marine silts and clays	Hartland (BP)	Suffield (BP)	Buxtor
Recent flood-plain deposits largely from granite, gneiss, or schist.		Ondawa (A)	Podunl
Do			
Organic soil			
Do			
Do			
Do			

Most of the soils are in the Podzol or Brown Podzolic great soil groups. Classification is difficult because the Brown Podzolic soils merge with the Podzols. Where best developed, Podzol soils have a definite and continuous leached gray horizon, whereas the Brown Podzolic either lack such a horizon or have it only in small localized areas. In this county, however, the difference is not so distinct. The line of separation between the two great soil groups is not sharp and gray horizons occur in almost all the soils classified as Brown Podzolic. Classification was made on the basis of the thickness of the ashy-gray leached horizon. The soils that in a virgin condition had an ashy-gray leached horizon thicker than 2 inches were placed in the Podzol group, and soils having a leached layer less than 2 inches thick were classified as Brown Podzolic.

The best-developed Podzols in the county are those of the Canaan, Adams, and Hermon series derived from granitic parent material.

Brown Podzolic soils cover most of the central and southern parts of the county. Predominant are those of the Charlton, Paxton, and Hollis series developed from schistose or gneissic material; the Bangor, Thorndike, and Colrain from limy schist, calcareous phyllite, slate, or quartzite; and the Shapleigh from pegmatite or coarse gneissic material.

Although most soils of the county are zonal and belong to the Podzol or Brown Podzolic great soil groups, there are some hydromorphic and Alluvial soils belonging to the intrazonal and azonal orders. The intrazonal soils are classified in two great soil groups—the Half Bog and Bog. The Alluvial soils of the county are azonal.

The poorly drained Half Bog soils have developed under the influence of a high water table. They have dark surface soils underlain by gray mineral parent material. They occur on loamy or sandy glacial till and outwash as well as on marine clays, and lack the brown ortstein or orterde B horizon of the Podzol or Brown Podzolic soils. The Biddeford, for example, is a Half Bog soil occurring mainly on poorly drained marine clay and is characterized by a dark-gray surface soil over a gray or light-gray subsoil mottled with yellowish gray and brown. The Half Bog soils usually have a cover of spruce, fir, pine, hemlock, birch, and alder; but some mixed stands of birch, beech, and maple occur on the Biddeford soil.

The Bog soils are scattered over the county in remnantal glacial lakes, ice-block sites, and other deep depressions filled with peat and muck deposits. Balch peat, shallowest of the Bog soils, is composed mostly of woody peat over lower horizons of sedge and sedimentary peat. Littlefield peat is composed mainly of sedges, rushes, or herbaceous peat and may be a little more saturated than Balch peat. Greenwood peat is somewhat like Balch and Littlefield peat but has, in addition, about 2 feet of sphagnum moss peat at the top of its profile. Waterboro muck is black, well-decomposed, and rarely more than 3 feet deep over mineral material, whereas Balch, Greenwood, and Littlefield peats are usually 3 feet deep and often extend to a depth of 20 feet. All the Bog soils are permanently wet. The vegetation on the peat soils is black spruce, tamarack, cedar, and heath bushes (*Ericaceae*). Spruce, fir, hemlock, birch, beech, and maple grow on Waterboro muck.

TABLE 8.—*pH determinations*[1] *of several soils of Waldo County, Maine*

Soil name and sample No.	Depth	pH
	Inches	
Paxton stony loam:		
100701	0–1½	4.7
100702	1½–3	4.6
100703	3–5	4.7
100704	5–11	5.1
100705	11–23	5.3
100706	23–37	5.3
100707	37–84	5.1
Bangor silt loam:		
100708	0–7	4.7
100709	7–9	4.7
100710	9–17	5.0
100711	17–42	5.0
100712	42–60	5.1
Dixmont loam:		
100713	0–6	5.9
100714	6–8	6.0
100715	8–35	5.9
100716	35+	6.1
Thorndike stony silt loam:		
100717	0–2½	4.8
100718	2½–3½	5.0
100719	3½–5	5.0
100720	5–9	5.1
100721	9–14	5.0
100722	14–24	5.0
Thorndike gravelly silt loam:		
100724	0–7	4.4
100725	7–12	4.9
Hermon stony fine sandy loam:[2]		
100726	0–6	6.0
100727	6–7	6.0
100728	7–8½	6.0
100729	8½–24	6.2
100730	24–39	5.6
100731	39–60	5.8
100732	60+	5.8
Charlton gravelly fine sandy loam:		
100733	0–6	5.7
100734	6–9	6.0
100735	9–22	6.1
100736	22–48	6.1
100737	96–120	6.3
Charlton loam:		
100738	0–½	4.8
100739	½–2	4.5
100740	2–2½	5.1
100741	2½–22	5.3
100742	22–40	5.3
100743	40–72	5.6
Stetson fine sandy loam:	*Inches*	
100744	0–7	5.4
100745	7–9	5.9
100746	9–17	6.0
100747	17–24	6.0
100748	24–34	6.0
100749	34–72	5.8
100750	72–108	5.7
Canaan stony loam:		
100751	0–1	4.7
100752	1–1½	4.8
100753	1½–2½	5.1
100754	2½–20	5.1
100755	20–30	5.3
100756	30–40	5.2
100757[3]	----------	----
Westford stony loam:		
100758	0–½	4.2
100759	½–2	4.3
100760	2–2¾	4.5
100761	2¾–20	4.8
100762[3]	----------	----
Buxton silty clay loam:		
100763	0–7	6.1
100764	7–18	6.3
100765	18–25	6.1
100766	25+	6.2
Westford very stony loam:		
100767	0–10	4.7
Adams loamy fine sand:		
100768	0–4	5.2
100769	4–7	5.4
100770	7–9	5.9
100771	9–23	5.6
100772	23–41	5.4
100773	[4] 96+	5.9
Etna gravelly sandy loam:		
100774	0–7	6.0
100775	7–17	6.2
100776	17–35	6.3
100777	35–120	6.0
(5)	120–240	----
Canaan loam:		
100778	0–½	4.4
100779	½–1½	4.7
100780	1½–4	5.0
100781	4–16	5.0
Acton loam:		
100782	0–9	5.7

See footnotes at end of table.

TABLE 8.—*pH determinations*[1] *of several soils of Waldo County, Maine*—Continued

Soil name and sample No.	Depth	pH	Soil name and sample No.	Depth	pH
	Inches			*Inches*	
Acton loam—Con.			Colrain loam:		
100783	9–12	5. 6	1007105	0–9	6. 1
100784	12–18	5. 7	1007106	9–17	6. 3
100785	18–23	5. 8	1007107	17–26	6. 2
Hartland silt loam:			1007108	40–50	6. 3
100786	0–7	5. 4			
100787	7–12	5. 5	Stetson gravelly sandy loam:		
100788	12–20	5. 3	1007109	0–4	5. 7
100789	20–32	5. 7	1007110	4–6	5. 1
100790	32–72	6. 9	1007111	6–8	6. 1
Etna gravelly loamy sand:[6]			1007112	8–22	6. 0
100791	0–2	5. 1	1007113	22–37	6. 0
100792	2–3	5. 1	1007114	37–96	5. 8
100793	3–4	5. 2			
100794	4–24	5. 6	Burnham stony silt loam:		
100795	48–72	5. 9	1007115	0–3	5. 5
100796	100–144	8. 2	1007116	3–5	5. 5
Sutton loam:			1007117	5–11	5. 7
100797	0–7	5. 5	1007118	11–17	5. 6
100798	7–13	5. 6			
100799	13–20	5. 7			
1007100	20	5. 8	Ondawa fine sandy loam:		
Hollis stony loam:			1007119	0–9	6. 0
1007101	0–1½	5. 0	1007120	9–13	6. 1
1007102	1½–3	5. 0	1007121	13–23	5. 9
1007103	3–10	4. 8	1007122	23–43	5. 8
1007104[7]	10	----			

[1] Soil pH determinations were made by the Maine Agricultural Experiment Station.
[2] Profile is much less acid than normal for Hermon stony fine sandy loam.
[3] No determination—parent rock ledge.
[4] Substratum.
[5] No determination—mainly coarse gravel and stone.
[6] Described with Etna loamy sand (see p. 49).
[7] No determination—mainly fragments of laminated rock.

The azonal soils of this county belong to the Alluvial great soil group. The Alluvial soils include the Ondawa, Podunk, Rumney, and Saco series. All the Alluvial soils except the Ondawa are subject to fresh deposition from time to time when streams overflow, and their profiles are consequently extremely variable. The Ondawa occupies rather broad valleys and is not inundated so frequently as the other soils in this group. The Saco soil, developed from clay alluvium, is similar to the hydromorphic Biddeford.

The pH values of several soils of the county are shown in table 8, and study of these reveals several interesting facts. The least acid soils are derived from silts and clays and have a pH value of 6.0 to 7.0. The Colrain soils, derived from loose sandy glacial till, have a pH value of 6.0 to 6.5.

The moderately acid soils include members of the Etna, Stetson, Burnham, and Dixmont series, all of which are from parent materials

that include some lime. Generally the pH for these is 5.5 to 6.0. The soils of the bottom lands are also moderately acid. The Hermon samples are moderately acid, but soil of this series is normally more acid than the samples indicate.

The soils developed on deep till are acid (pH 5.0 to 5.5); whereas the very shallow soils on till derived from pyritiferous schist and micaceous gneiss are extremely acid. The very shallow extremely acid soils are mainly of the Hollis and Westford series. The Thorndike and Canaan are shallow soils but are less acid than the Hollis and Westford. The Thorndike soil, in particular, is more acid than its limy parent material would indicate. Direct weathering of the limy slate, quartzite, and phyllite in its parent material probably causes the unexpected acidity of the shallow Thorndike soil. As shown in table 8, the surface soil of Thorndike stony silt loam has a pH of 4.8 to 5.0.

Analyses of soils on outwash—the Etna and Stetson—are interesting from a genetic point of view. Samples 100791 to 100796 of Etna gravelly loamy sand (described as a loamy sand) are calcareous. The layer designated by sample 100796, in particular, has a pH of 8.20 and is composed of fine gravel that effervesces in hydrochloric acid. Other samples of Etna and Stetson soils, although not calcareous, have slightly acid to nearly neutral gravel in their soil layers and substrata. It is obvious from the foregoing that the porous material of Etna and Stetson soils has not undergone extreme weathering.

The presence of limestone in the parent material of the Etna soils was verified by a rock count taken in a gravel pit. The count was as follows:

	Number of rocks
Diabase	1
Diorite	1
Gneiss	16
Granite	4
Limestone	6
Quartz	5
Quartzite	40
Micaceous quartzite	15
Schist	11

The soils of the county can also be grouped on the basis of general textural differences. The soils derived from coarse gneiss, schist, granite, and igneous material are predominantly loam or sandy loam in texture; whereas those derived from slate phyllite, quartzite, and metamorphosed siliceous limestone usually have a silt loam texture.

The predominant textures of the county are indicated in table 9 by samples of several soils. The samples of Paxton loam represent the textures of most soils in the southeastern part of the county, including the Charlton. Most soils of the western and northwestern areas around Knox and Unity have textures like those shown in the samples of Bangor silt loam.

The Dixmont samples represent most of the sloping, tilled, imperfectly drained soils that occur in tracts where textures are mainly like those of Bangor silt loam. Although the Dixmont soils have a loam texture in the surface soil, their subsoil is heavier and is of almost the same texture as the subsoil of Thorndike stony silt loam.

TABLE 9.—*Mechanical analyses of five soils of Waldo Cou*

Soil name and sample number	Depth	Fine gravel (2 mm.–1 mm.)	Coarse sand (1 mm.–0.5 mm.)	Medium sand (0.5 mm.–0.25 mm.)	Fine sand (0.25 mm.–0.10 mm.)	Ve
Paxton stony loam:	*Inches*	*Percent*	*Percent*	*Percent*	*Percent*	
100701	0–1½	2.1	6.6	4.5	11.1	
100702	1½–3	5.0	6.3	4.1	9.3	
100703	3–5	15.9	13.1	5.9	9.9	
100704	5–11	13.5	17.2	8.9	14.2	
100705	11–23	17.0	15.1	7.4	12.9	
100706	23–37	15.9	19.0	12.2	19.8	
100707	37–84	10.8	10.2	5.3	10.3	
Bangor silt loam:						
100708	0–7	8.2	7.4	3.2	5.8	
100709	7–9	9.2	8.3	3.7	6.2	
100710	9–17	11.1	9.5	3.3	5.3	
100711	17–42	7.7	7.6	3.8	7.4	
100712	42–60	7.1	6.8	4.1	7.8	
Dixmont loam:						
100713	0–6	8.6	10.3	6.0	10.4	
100714	6–8	10.2	10.1	6.1	12.7	
100715	8–35	4.3	7.3	5.0	10.9	
100716	35+	3.2	4.9	3.2	7.6	
Thorndike stony silt loam:						
100717	0–2½	1.2	6.4	7.5	15.5	
100718	2½–3½	1.7	5.7	6.8	14.5	
100719	3½–5	2.8	6.1	5.8	9.8	
100720	5–9	5.1	8.5	5.9	8.7	
100721	9–14	8.0	9.1	5.9	8.1	
100722	14–24	6.0	8.0	4.7	6.9	
Thorndike gravelly silt loam, severely eroded phase:						
100724	0–7	6.4	8.5	4.5	8.3	
100725	7–12	6.2	8.6	4.5	8.2	

The samples of Thorndike stony silt loam have textures representative of those occurring in most of the shallow soils in the central-northwestern part of the county that developed from interbedded quartzite, phyllite, schist, slate, and metamorphosed siliceous limestone. Included for the sake of comparison are samples of Thorndike gravelly silt loam, severely eroded phase. In comparing the samples of Thorndike stony silt loam with those of this gravelly eroded phase it will become evident that the samples from the eroded phase have essentially the same texture as the two lowest layers of Thorndike stony silt loam. The severely eroded phase of Thorndike gravelly silt loam is therefore composed mainly of subsoil material.

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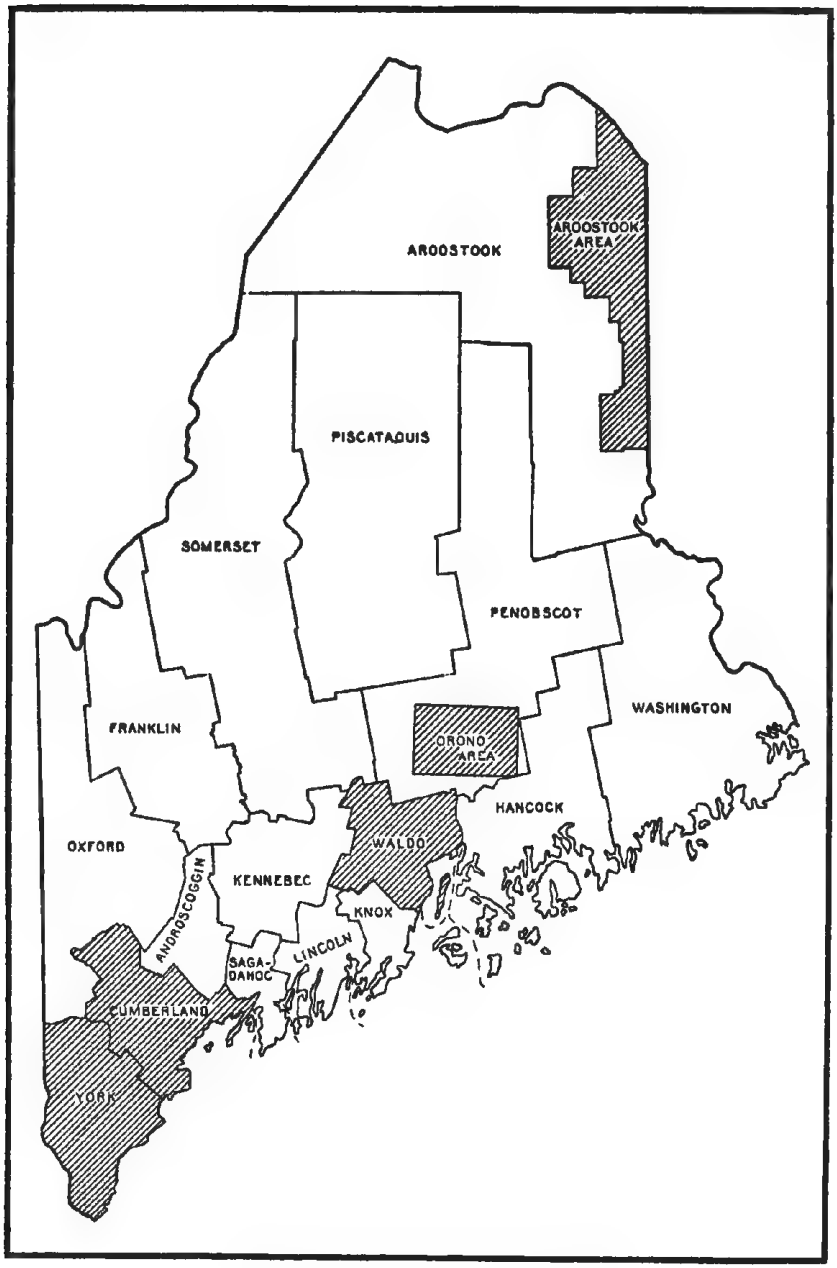

Areas surveyed in Maine shown by shading.

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IMPORTANT CHARACTERISTICS OF THE SOILS OF WALDO COUNTY, MAINE

Soil	Map symbol	Group (according to legend of soil map)	Parent material	Dominant slope	Surface soil		Subsoil		General fertility [1]	Workability [2]	Erodibility [3]
					Color and texture	Consistence	Color and texture	Consistence			
				Percent							
Acton loam	AA	Stone-cleared imperfectly drained soils of uplands.	Saturated or semisaturated granitic till containing boulders.	0–8	Dark grayish-brown loam.	Friable	Pale-yellow loam mottled with gray.	Firm	Moderately high	Fair	Negligible.
Sloping phase	AB	do	do	8–16	do	do	do	do	do	do	Moderate.
Acton stony loam	AC	Stony imperfectly and poorly drained soils of uplands.	do	0–8	Dark-brown to dark grayish-brown stony loam.	do	Pale-yellow loam mottled with gray and brown.	do	do	(Needs clearing)	Negligible.
Sloping phase	AD	do	do	8–16	do	do	do	do	do	do	Moderate.
Adams fine sandy loam	AE	Well-drained soils of smooth outwash, stream terraces, and flood plains.	Pale yellowish gray very firm to hard clay or slightly hard fine sandy clay.	0–3	Dark-brown or grayish-brown fine sandy loam.	Very friable	Yellowish-brown loamy fine sand.	Moderately firm	High	Excellent	Negligible.
Adams loamy fine sand	AF	do	do	3–8	Dark yellowish-brown loamy fine sand over 2- to 3-inch light-gray layer.	Loose	do	Loose	Low	do	Do.
Steep phase	AG	Gravelly or very sandy soils on rough glacial outwash and terrace escarpments.	do	20–40	do	do	do	do	Very low	Poor	Rapid.
Agawam loamy very fine sand	AH	Well-drained soils of smooth outwash, stream terraces, and flood plains.	Olive to pale-olive fine sand of mixed materials.	0–3	Brown loamy very fine sand.	do	Bright yellow or olive-yellow fine sand or sand.	Slightly compact	High	Excellent	Negligible.
Alluvial soils, undifferentiated	AK	Imperfectly drained sandy soils of smooth outwash, stream terraces, and flood plains.	Mottled gray, yellow, and brown semisaturated mixed sand, silt, and clay.	0–3	Dark-brown and dark-gray mixture of sandy loam and loam.	do	Mottled and streaked gray, yellow, and brown sand, silt, and sandy clay.	do	Moderately high	Poor	Do.
Balch peat	BA	Organic soils, poorly drained	Brown coarse porous woody peat over fine peat.	0–2	Black granular muck	Matted	Brown moderately coarse woody peat.	Somewhat compact	Low	do	Do.
Bangor gravelly silt loam	BB	Stone-cleared level to sloping well-drained deep soils on compact till.	Compact, pervious, sometimes vesicular pale-olive, yellow, or gray glacial till.	0–8	Grayish-brown gravelly silt loam.	Moderately firm or friable.	Pale yellowish-brown gravelly loam.	Moderately compact	High	Good	Do.
Eroded sloping phase	BC	Stone-cleared eroded and steep soils on deep till.	do	8–16	Pale yellowish-brown gravelly silt loam.	Moderately firm	do	do	Moderately high	Fair	Rapid.
Sloping phase	BD	Stone-cleared level to sloping well-drained deep soils on compact till.	do	8–16	Grayish-brown gravelly silt loam.	Moderately firm or friable.	do	do	do	Good	Moderate.
Steep phase	BE	Stone-cleared eroded and steep soils on deep till.	do	20–30	Pale yellowish-brown gravelly silt loam.	Moderately firm	do	do	do	Poor	Destructive.
Bangor-Hartland stony complex	BF	Stony nonarable soils	Mixture of hard clay and stony glacial till.	8–16	Dark grayish-brown stony silt loams.	Friable or firm	Dark olive-brown or yellow stony silt loam.	Firm	Low	do	Rapid.
Bangor silt loam	BG	Stone-cleared level to sloping well-drained deep soils on compact till.	Compact, pervious, sometimes vesicular pale olive-yellow or gray glacial till.	0–8	Pale-brown gritty silt loam.	Friable to moderately firm.	Dull olive-brown or brownish-yellow gritty silt loam.	Moderately firm or friable.	Very high	Good	Negligible.
Moderately eroded phase	BH	do	do	0–8	do	do	do	do	High	do	Moderate.
Sloping phase	BK	do	do	8–16	do	do	do	do	do	Fair	Rapid.
Steep phase	BL	Stone-cleared eroded and steep soils on deep till.	do	20–30	do	do	do	do	Moderately high	Poor	Destructive.
Bangor stony silt loam	BM	Stony level to sloping well-drained soils on deep till.	do	8–16	Dark-brown stony silt loam over 1- or 2-inch grayish-yellow layer.	Friable	do	do	do	(Needs clearing)	Moderate.
Smooth phase	BN	do	do	0–8	do	do	do	do	High	do	Slight.
Steep phase	BO	Stony nonarable soils	do	20–30	do	do	do	do	Moderately high	Poor	Destructive.
Biddeford silt loam	BP	Stone-free imperfectly and poorly drained fine-textured soils.	Semisaturated mottled gray very hard or plastic clay or silty clay.	0–3	Very dark gray silt loam	Firm	Mottled light-gray, yellow, and dark-gray silty clay.	Moderately sticky or hard.	do	do	Do.
Burnham silt loam	BR	Stone-cleared poorly drained soils of uplands.	Mottled gray, saturated, slightly limy glacial till.	0–3	Very dark grayish-brown silt loam.	Moderately firm	Mottled gray and yellow saturated gravelly silt loam or loam.	Firm	do	do	Do.
Burnham stony silt loam	BS	Stony imperfectly and poorly drained soils of uplands.	do	0–5	Dark grayish-brown stony silt loam.	Firm or friable	do	do	Low	do	Do.
Buxton silt loam	BU	Stone-free imperfectly and poorly drained fine-textured soils.	Mottled gray sticky or hard semisaturated clay or silty clay.	0–3	Dark grayish-brown silt loam.	Friable or moderately firm.	Mottled grayish-yellow semisaturated silt or silty clay loam.	Plastic or hard	do	do	Negligible.
Buxton-Biddeford stony silty clay loams.	BT	Stony nonarable soils	do	0–5	Grayish-brown or dark-gray stony silty clay loam.	Firm	Mottled yellow and gray clay and stony till.	Hard or sticky	do	do	Do.
Canaan loam	CA	Stone-cleared well-drained level to sloping shallow soils.	Granite ledge of hard rock 30 inches or less from surface.	0–8	Brown loam	Friable or very friable.	Yellowish-brown sandy loam.	Loose or very friable	do	Good	Moderate.
Sloping phase	CB	do	do	8–15	do	do	do	do	do	do	Rapid.
Steep phase	CC	Stone-cleared eroded and steep soils on shallow till or ledge land.	do	20–30	do	do	do	do	do	Poor	Destructive.
Canaan stony loam	CD	Stony nonarable soils	do	0–16	Dark-brown stony loam over 2- or 3-inch layer of light-gray loam or sandy loam.	Moderately loose	do	do	do	(Needs clearing)	Slight.
Canaan very stony loam	CE	do	do	8–16	do	do	do	do	Very low	Poor	Rapid.
Hilly phase	CF	do	do	20–30	do	do	do	do	do	do	Destructive.
Charlton gravelly fine sandy loam	CG	Stone-cleared level to sloping well-drained deep soils on loose to firm till.	Pale olive-gray or grayish-yellow moderately compact but pervious gniessic and schistose till.	3–8	Brown gravelly fine sandy loam.	Very friable	Yellowish-brown to olive-gray gravelly sandy loam.	Friable	Moderately high	Good	Slight.
Rolling phase	CH	do	do	8–15	do	do	do	do	do	Fair	Moderate.
Charlton loam	CK	do	do	3–8	Dark-brown loam	Friable	Olive-brown or yellowish-brown gravelly or sandy loam.	do	Very high	Excellent	Slight.
Eroded sloping phase	CL	Stone-cleared eroded and steep soils on deep till.	do	8–16	Brown or yellowish-brown gritty loam.	Very friable	do	do	Moderately high	Fair	Rapid.
Eroded steep phase	CM	do	do	20–30	do	do	do	do	Very low	Poor	Destructive.
Sloping phase	CN	Stone-cleared level to sloping well-drained deep soils on loose to firm till.	do	8–15	Dark-brown loam	Friable	do	do	High	Good	Moderate.
Steep phase	CO	Stone-cleared eroded and steep soils on deep till.	do	20–30	Brown or yellowish-brown gritty loam.	Very friable	do	do	Low	Poor	Destructive.
Charlton stony loam	CP	Stony level to sloping well-drained soils on deep till.	do	8–16	Brown stony loam	Friable	Dark yellowish-brown slightly compact stony loam.	Firm but friable	High	Good	Moderate.
Steep phase	CR	Stony nonarable soils	do	20–30	do	do	do	do	Low	Poor	Rapid.
Undulating phase	CS	Stony level to sloping well-drained soils on deep till.	do	0–8	do	do	do	do	High	Excellent	Slight.
Coastal beach	C				Miscellaneous land type (see text for description).						
Colrain loam	CT	Stone-cleared level to sloping well-drained deep soils on loose to firm till.	Olive-brown or brownish-yellow moderately loose bouldery glacial till.	0–8	Bright-brown loam containing limy pebbles.	Very friable	Bright yellowish-brown or brown fine sandy loam.	Firm to loose	Moderately high	do	Do.
Rolling phase	CU	do	do	8–15	do	do	do	do	do	Fair	Moderate.
Steep phase	CV	Stone-cleared eroded and steep soils on deep till.	do	20–35	do	do	do	do	Low	Poor	Rapid.
Colrain stony loam	CW	Stony level to sloping well-drained soils on deep till.	do	8–16	Dark-brown stony loam over 1- or 2-inch light grayish-yellow layers.	Friable	Yellowish-brown stony fine sandy loam.	Very friable	Moderately high	(Needs clearing)	Slight.
Steep phase	CX	Stony nonarable soils	do	20–45	do	do	do	do	Low	Fair	Rapid.
Undulating phase	CY	Stony level to sloping well-drained soils on deep till.	do	3–8	do	do	do	do	High	(Needs clearing)	Negligible.
Dixmont loam	DA	Stone-cleared imperfectly drained soils of uplands.	Mottled gray and yellow semisaturated firm or very firm bouldery glacial till.	0–8	Very dark grayish-brown loam.	do	Slightly mottled yellowish-brown and gray loam or stony loam.	Moderately firm to firm.	Moderately high	Fair	Slight.
Sloping phase	DB	do	do	8–16	do	do	do	do	Low	do	Moderate.
Dixmont stony loam	DC	Stony imperfectly and poorly drained soils of uplands.	do	0–8	Dark to very dark-brown stony loam.	do	do	do	Moderately high	(Needs clearing)	Slight.
Sloping phase	DD	do	do	8–16	do	do	do	do	Low	do	Moderate.
Etna fine sandy loam	EA	Gravelly or very sandy soils on rough glacial outwash and terrace escarpments.	Loose porous mixture of cobblestones, gravel, and sand.	8–16	Dark-brown or brownish-yellow sandy loam.	Very friable	Brownish-yellow to yellowish-gray mixture of gravel and fine sandy loam.	Loose	Moderately high	Good	Do.
Etna gravelly sandy loam	EB	do	do	8–16	Dark-brown or brownish-yellow gravelly sandy loam.	Loose	Pale-yellow to dark-gray sand and gravel.	do	Low	Fair	Rapid.
Hilly phase	EC	do	do	20–30	do	do	do	do	Very low	Poor	Do.
Etna-Hartland very fine sandy loams	ED	do	Mixture of very firm clay or clay loam and loose gravel and sand.	8–16	Yellowish-brown or grayish-brown fine sandy loam and clay loam mixed.	Friable	Mixtures of pale yellowish-brown or gray clay loam and sandy or gravelly loam.	Clay loam: Friable to firm. Sandy or gravelly loam: Loose.	High	Good	Moderate.
Eroded hilly phases	EE	do	do	16–30	do	do	do	do	Very low	Poor	Destructive.
Eroded phases	EF	do	do	8–16	do	do	do	do	Low	Fair	Rapid.
Hilly phases	EG	do	do	16–30	do	do	do	do	Very low	do	Destructive.
Etna loamy sand	EH	do	do	8–16	Grayish-brown loamy sand.	Loose	Brownish-yellow to gray sand.	Loose	do	Excellent	Slight.
Hilly phase	EK	do	do	20–30	do	do	do	do	do	Fair	Moderate.
Fresh water marsh					Miscellaneous land type (see text for description)						
Greenwood peat	GA	Organic soils, poorly drained	Alternating bands of finely and coarsely fibrous peat.	0–3	Brown coarsely fibrous sphagnum-moss peat.	Fibrous	Brown fibrous sphagnum-moss peat.	Loose to firm	Moderately high	Poor	Negligible.
Hartland fine sandy loam	HA	Well-drained rolling to steep soils on marine and lake deposits.	Dark-gray and light yellowish-gray slightly mottled very firm or hard and somewhat plastic clay or silty clay.	8–16	Brown to grayish-brown fine sandy loam.	Very friable	Pale yellowish-brown to yellowish-gray fine sandy clay loam or silty clay loam.	Firm, slightly sticky	High	Fair	Rapid.
Severely eroded phase	HB	do	do	8–16	do	do	do	do	Low	Poor	Destructive.
Severely eroded steep phase	HC	do	do	20–35	do	do	do	do	Very low	do	Do.
Steep phase	HD	do	do	20–35	do	do	do	do	Moderately high	do	Rapid.
Hartland silt loam	HE	do	do	8–16	Brown to grayish-brown silt loam.	Friable	Gray or dark-gray and yellowish-gray slightly mottled clay or silty clay.	Very firm or hard and sticky.	High	do	Do.
Eroded phase	HF	do	do	8–16	do	do	do	do	Low	do	Destructive.
Severely eroded steep phase	HG	do	do	20–30	do	do	do	do	Very low	do	Do.
Steep phase	HH	do	do	20–50	do	do	do	do	Low	do	Rapid.
Hermon fine sandy loam	HI	Stone-cleared level to sloping well-drained deep soils on loose to firm till.	Gray or pale yellowish-gray very friable granitic glacial till containing many boulders.	3–8	Brown fine sandy loam	Very friable	Yellowish-brown to yellowish-gray gritty fine sandy loam.	Friable or moderately firm.	High	Excellent	Slight.
Eroded sloping phase	HJ	Stone-cleared eroded and steep soils on deep till.	do	8–16	do	do	do	do	Low	Fair	Destructive.
Sloping phase	HK	Stone-cleared level to sloping well-drained deep soils on loose to firm till.	do	8–16	do	do	do	do	Moderately high	Good	Moderate.
Steep phase	HL	Stone-cleared eroded and steep soils on deep till.	do	20–45	do	do	do	do	Low	Fair	Rapid.
Hermon stony fine sandy loam	HM	Stony level to sloping well-drained soils on deep till.	do	8–16	Dark grayish-brown stony fine sandy loam over 2- or 3-inch light-gray layer.	do	Dark-brown to yellowish-gray gritty fine sandy loam.	Moderately firm	Moderately high	(Needs clearing)	Moderate.
Undulating phase	HN	do	do	3–8	do	do	do	do	High	do	Slight.
Hermon very stony fine sandy loam	HO	Stony nonarable soils	do	10–45	Dark grayish-brown very stony loam.	do	Grayish-yellow bouldery loam.	Very friable	Low	Poor	Rapid.
Hinsdale gravelly sandy loam, rolling phase.	HR	Stone-cleared well-drained level to sloping shallow soils.	Deeply weathered black granite or syenite ledge.	8–16	Brown to yellowish-brown gravelly sandy loam speckled with black.	Loose	Pale-brown to yellowish-brown gritty sandy loam.	Very friable or loose	do	Fair	Moderate.

See footnotes at end of table.

IMPORTANT CHARACTERISTICS OF THE SOILS OF WALDO COUNTY, MAINE—Continued

Soil	Map symbol	Group (according to legend of soil map)	Parent material	Dominant slope	Surface soil		Subsoil		General fertility [1]	Workability [2]	Erodibility [3]
					Color and texture	Consistence	Color and texture	Consistence			
Hinsdale stony sandy loam	Hs	Stony nonarable soils	Deeply weathered black granite or syenite ledge.	*Percent* 5 16	Dark-brown to yellowish-gray gritty stony sandy loam.	Loose	Strong yellowish-brown to pale yellowish-brown sandy loam.	Firm to friable	Low	Poor	Moderate.
Hilly phase	Ht	do	do	16–30	do	do	do	do	Very low	do	Rapid.
Hollis gravelly loam	Hu	Stone-cleared well-drained level to sloping shallow soils.	Weathered ledges of pyritiferous schist and micaceous gneiss.	0– 8	Light-brown or yellowish-brown gravelly loam.	Friable	Bright-olive gravelly loam	Firm but friable	Moderately high	Fair	Moderate.
Sloping phase	Hv	do	do	8–16	do	do	do	do	do	Poor	Rapid.
Hollis loam	Hw	do	do	0– 8	Bright-brown loam containing schist fragments.	Very friable	Bright olive-brown loam	Firm to friable	High	Good	Slight.
Eroded sloping phase	Hx	Stone-cleared eroded and steep soils on shallow till or ledge land.	do	8–16	do	do	do	do	Low	Poor	Rapid.
Eroded steep phase	Hy	do	do	20–30	do	do	do	do	Very low	do	Destructive.
Sloping phase	Hz	Stone-cleared well-drained level to sloping shallow soils.	do	8–16	do	do	do	do	Moderately high	Fair	Moderate.
Steep phase	H2	Stone-cleared eroded and steep soils on shallow till or ledge land.	do	20–30	do	do	do	do	Very low	Poor	Destructive.
Hollis stony loam	H3	Stony nonarable soils	do	0–16	Light-gray to yellowish-brown stony loam.	Friable	Yellowish-brown, green-tinged loam to fine sandy loam.	Somewhat loose	Low	(Needs clearing)	Fair.
Littlefield peat	La	Organic soils, poorly drained	Dark-brown peat from sedges, grasses, and some woody material.	0– 2	Black crumbly saturated muck.	Fibrous	Alternating bands of brown fine and coarse sedge peat.	Loose	do	Poor	Negligible.
Melrose fine sandy loam	Ma	Well-drained soils of smooth outwash, stream terraces, and flood plains.	Gray to dark-gray very fine sandy or silty clay or clay loam.	0– 3	Brown fine sandy loam	Friable or very friable.	Yellowish-brown loamy fine sand.	Very friable	Very high	Excellent	Do.
Undulating phase	Mb	do	do	3– 8	do	do	do	do	High	Good	Slight.
Ondawa fine sandy loam	Oa	do	Gray or grayish-yellow bands of coarse sand and gravel.	0– 3	Dark-brown very fine sandy loam.	Very friable	Brownish-yellow loamy fine sand.	Loose	do	Excellent	Negligible.
Paxton loam	Pa	Stone-cleared level to sloping well-drained deep soils on compact till.	Olive-gray compact or hard and somewhat laminated gneissic glacial till.	0– 8	Dark-brown loam	Friable	Brown to yellowish-brown gravelly loam.	Friable to firm	do	Good	Moderate.
Eroded sloping phase	Pb	Stone-cleared eroded and steep soils on deep till.	do	8–16	Brown to yellowish-brown gritty loam.	Moderately firm	do	do	Moderately high	Fair	Rapid.
Eroded steep phase	Pc	do	do	20–30	do	do	do	do	Low	Poor	Destructive.
Sloping phase	Pd	Stone-cleared level to sloping well-drained deep soils on compact till.	do	8–16	Dark-brown loam	Friable	do	do	Moderately high	Fair	Rapid.
Steep phase	Pe	Stone-cleared eroded and steep soils on deep till.	do	20–30	Brown to yellowish-brown gritty loam.	Moderately firm	do	do	Low	Poor	Destructive.
Paxton stony loam	Pf	Stony level to sloping well-drained soils on deep till.	do	8–16	Dark-brown stony loam over 1- to 2½-inch brownish-gray layer.	Friable	Brownish to olive-yellow or gray stony loam.	Friable to firm	High	(Needs clearing)	Rapid.
Steep phase	Pg	Stony nonarable soils	do	20–30	do	do	do	do	Low	Poor	Destructive.
Undulating phase	Ph	Stony level to sloping well-drained soils on deep till.	do	3– 8	do	do	do	do	High	(Needs clearing)	Moderate.
Podunk fine sandy loam	Pk	Imperfectly drained sandy soils of smooth outwash, stream terraces, and flood plains.	Somewhat mottled gray and yellow bands of sand, silt, and clay loam.	0– 3	Gray sandy outwash and dark grayish-brown loam.	Loose to friable	Dark-gray to gray sandy loam.	Moderately firm	Moderately high	Fair	Negligible.
Rock outcrop	Ra	Miscellaneous nonarable land types.		0–100	Normally no soil or vegetation.				Very low	Poor	Destructive.
Rough stony land: Canaan soil material	Rb	do		30–50+	All land characterized by excessive stoniness and huge boulders. (See individual soil descriptions for kinds of soil material.)				do	do	Do.
Paxton soil material	Rc	do		30–50+					Moderately high	do	Do.
Thorndike soil material	Rd	do		30–50+					Low	do	Do.
Westford soil material	Re	do		30–50+					Very low	do	Do.
Rumney loam	Rf	Poorly drained soils on smooth glacial outwash, stream terraces, and flood plains.	Wet, extremely mottled, gray, brown, or yellow clay-or-silt-varved loamy sand.	0– 2	Dark-brown to grayish-brown fine sandy loam.	Friable to loose	Wet, mottled gray, brown, and yellow loamy sand.	Friable	Low	Very low	Negligible.
Saco silt loam	Sa	Stone-free imperfectly and poorly drained fine-textured soils.	Extremely mottled gray and yellow very firm or hard and plastic silty clay.	0– 2	Very dark-brown silt loam.	Firm	Mottled brown and yellow or gray sticky silty clay.	Very firm	Moderately high	do	Do.
Saco silty clay loam	Sb	do	do	0– 2	Dark-gray silty clay loam.	Very firm	do	do	do	do	Do.
Scarboro fine sandy loam	Sc	Poorly drained soils on smooth glacial outwash, stream terraces, and flood plains.	Saturated gray sand, sandy clay, or fine sand.	0– 2	Black loam or loamy sand	Very friable	Mottled gray, brown, and yellow saturated sand or loamy sand.	Rather firm	do	do	Do.
Shapleigh loam	Sd	Stone-cleared well-drained level to sloping shallow soils.	Slightly weathered hard rock ledge of coarse gneiss or pegmatite.	0– 8	Dark-brown to brown gritty loam.	Friable	Yellowish-brown to yellowish-gray gritty loam.	Firm to very friable	do	Good	Slight.
Sloping phase	Se	do	do	8–16	do	do	do	do	Low	Fair	Rapid.
Steep phase	Sf	Stone-cleared eroded and steep soils on shallow till or ledge land.	do	20–30	do	do	do	do	do	Poor	Destructive.
Stetson fine sandy loam	Sg	Well-drained soils of smooth outwash, stream terraces, and flood plains.	Alternating bands of stratified sand and gravel.	0– 8	Dark grayish-brown fine sandy loam.	Very friable	Dark-brown semi-indurated loamy fine sand.	Firm	High	Excellent	Negligible.
Stetson gravelly sandy loam	Sh	do	do	0– 8	Dark grayish-brown gravelly sandy loam over thin light-gray layer of gravelly sand.	do	Brownish-yellow layers of loamy sand and gravel.	do	Moderately high	Fair	Do.
Steep phase	Sk	Gravelly or very sandy soils on rough glacial outwash and terrace escarpments.	do	20–35	do	do	do	do	Low	Poor	Rapid.
Stetson loamy sand	Sl	Well-drained soils of smooth outwash, stream terraces, and flood plains.	Alternating bands of stratified sand and gravel.	0– 8	Dark grayish-brown loamy sand.	Loose	Dark-brown semi-indurated loamy fine sand.	do	do	Excellent	Negligible.
Stetson-Suffield very fine sandy loams	Sm	Well-drained level to undulating soils on marine and lake deposits.	Dark-gray or gray firm or hard silty clay and loose sand.	0– 8	Dark-brown mixture of fine sandy loams.	Firm or loose	Gray or yellow mixtures of fine sandy clay and loamy fine sand.	Moderately firm	High	Good	Slight.
Sudbury fine sandy loam	Sn	Imperfectly drained sandy soils of smooth outwash, stream terraces, and flood plains.	Mottled gray and yellow wet friable loamy sand or clay.	0– 3	Dark grayish-brown fine sandy loam or loam.	Friable	Yellowish-brown slightly mottled with yellow or gray fine sand.	do	Moderately high	Fair	Negligible.
Suffield fine sandy loam	So	Well-drained level to undulating soils on marine and lake deposits.	Gray, dark-gray, and yellowish-gray slightly mottled very firm clay, silty clay, or clay loam.	3– 8	Dark grayish-brown fine sandy loam.	Very friable	Yellowish-brown fine sandy loam or loam.	Friable	Very high	Good	Do.
Eroded phase	Sp	do	do	3– 8	do	do	do	do	Moderately high	Fair	Moderate.
Suffield silt loam	Sr	do	Mottled gray and dark-gray very firm hard or plastic clay or silty clay.	3– 8	Dark-grayish brown silt loam.	Friable	Yellow to pale yellowish-gray silt or silty clay loam.	Very firm or hard	High	do	Rapid.
Eroded phase	Ss	do	do	3– 8	do	do	do	do	do	do	Do.
Severely eroded phase	St	do	do	3– 8	do	do	do	do	Moderately high	Poor	Destructive.
Sutton loam	Su	Stone-cleared imperfectly drained soils of uplands.	Mottled gray and yellow, wet, firm, gritty loam and bouldery glacial till.	0– 8	Yellowish-brown loam	do	Slightly mottled yellow or brown and gray gritty loam.	Moderately firm	do	Fair	Slight.
Sloping phase	Sv	do	do	8–16	do	do	do	do	do	do	Rapid.
Sutton stony loam	Sw	Stony imperfectly and poorly drained soils of uplands.	do	3– 8	Light-brown stony loam	Very friable	do	do	do	(Needs clearing)	Slight.
Shallow phase	Sx	do	do	3– 8	do	do	do	do	Very low	Nonarable	Moderate.
Sloping phase	Sy	do	do	8–16	do	do	do	do	Moderately high	(Needs clearing)	Do.
Sutton very stony loam	Sz	do	Extremely bouldery till	3–16	Light-brown extremely stony loam.	Friable	Bouldery mottled loam	Firm	Very low	Nonarable	Do.
Thorndike gravelly silt loam	Ta	Stone-cleared well-drained level to sloping shallow soils.	Slightly weathered ledges of limy slate, quartzite, phyllite, and schist.	0– 8	Dark-grayish brown gravelly silt loam containing many limy slate fragments.	do	Brownish-yellow gravelly loam.	Moderately firm to very friable.	Moderately high	Fair	Do.
Hilly phase	Tb	Stone-cleared eroded and steep soils on shallow till or ledge land.	do	15–30	do	do	do	do	Low	Poor	Destructive.
Rolling phase	Tc	Stone-cleared well-drained level to sloping shallow soils.	do	8–16	do	do	do	do	Moderately high	Fair	Moderate.
Thorndike silt loam	Td	do	do	0– 8	Dark-brown silt loam containing a few limy rock fragments.	do	Yellowish-brown or pale grayish-yellow gravelly loam.	do	High	Good	Slight.
Eroded hilly phase	Te	Stone-cleared eroded and steep soils on shallow till or ledge land.	do	20–30	Pale yellowish-brown gritty silt loam.	Very friable to moderately firm.	do	do	Very low	Poor	Destructive.
Eroded sloping phase	Tf	do	do	8–16	do	do	do	do	Low	Fair	Rapid.
Hilly phase	Tg	do	do	15–30	do	do	do	do	do	Poor	Destructive.
Moderately eroded phase	Th	Stone-cleared well-drained level to sloping shallow soils.	do	3– 8	Dark-brown silt loam	Friable	do	do	High	Fair	Moderate.
Sloping phase	Tk	do	do	8–15	do	do	do	do	Moderately high	do	Rapid.
Thorndike stony silt loam	Tl	Stony nonarable soils	Slightly to well-weathered limy edges.	8–16	Dark grayish-brown stony silt loam over 1- or 2-inch layer of light brownish-gray loam.	do	Brown to brownish-yellow or gray stony silt loam.	Friable	do	(Needs clearing)	Moderate.
Hilly phase	Tm	do	do	16–30	do	do	do	do	Low	Poor	Destructive.
Tidal marsh					Miscellaneous land type (see text for description).						
Waterboro muck	Wa	Organic soils, poorly drained	Dark-brown to black slimy muck over sand or silt.	0– 2	Coarse granular black muck.	Friable	Fine granular black slimy muck.	Very friable	Moderately high	do	Negligible.
Westford stony loam	Wb	Stony nonarable soils	On weathered hard rock ledges of schist and micaceous gneiss.	8–16	Dark-brown mixture of forest litter and black stony loam.	Very friable	Brown to bright yellowish-brown stony loam.	Firm to friable	Very low	do	Rapid.
Wtesford very stony loam	Wc	do	do	16–45	do	do	do	do	do	do	Do.
Whitman loam	Wd	Stone-cleared poorly drained soils of uplands.	Mottled gray and pale-yellow saturated granitic glacial till.	0– 3	Dark-gray or black loam	Crumbly	Wet, mottled gray and yellow stony loam.	Firm to loose	do	do	Negligible.
Whitman stony loam	We	Stony imperfectly and poorly drained soils of uplands.	do	0–10	Dark-gray or black stony loam.	do	do	do	do	do	Do.
Whitman very stony loam	Wf	do	do	0–10	do	do	do	do	do	do	Do.

[1] General fertility under average management.

[2] Workability refers to ease of tillage as affected by slope, drainage, stoniness and texture.

[3] Erodibility refers to erosion of cultivated areas.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL MAP
WALDO COUNTY - MAINE
SHEET NO. 1

UNIVERSITY OF MAINE
AGRICULTURAL EXPERIMENT STATION

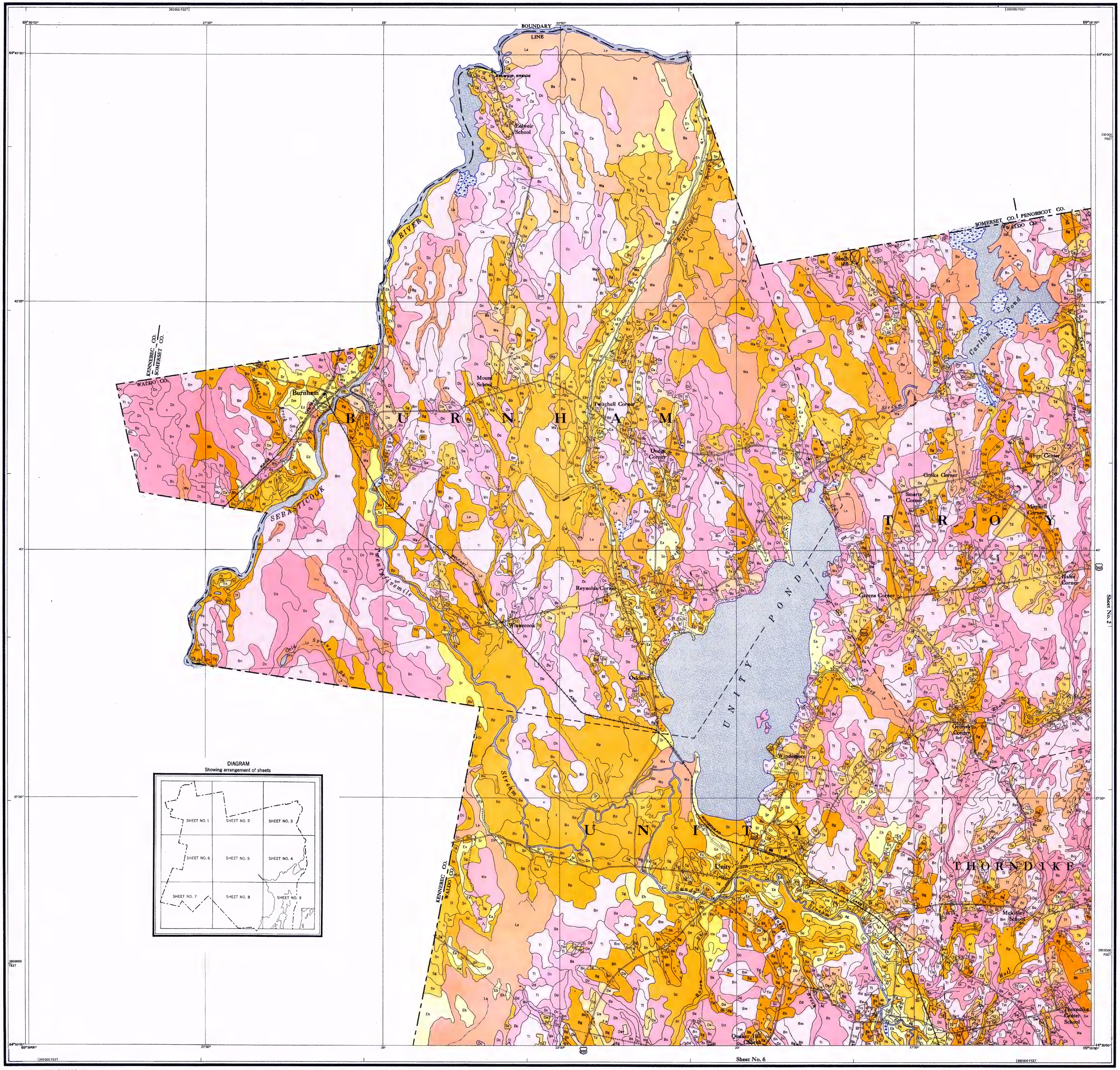


DIAGRAM
Showing arrangement of sheets

SHEET NO. 1	SHEET NO. 2	SHEET NO. 3
SHEET NO. 6	SHEET NO. 5	SHEET NO. 4
SHEET NO. 7	SHEET NO. 8	SHEET NO. 9

Scale 1:31,680
1 0 1 2 Miles
5000 0 5000 10000 Feet

NOTE: See sheet 7 for alphabetical legend, sheet 2 for color grouping, and sheet 3 or 6 for conventional signs.

J. Kenneth Ableiter, Chief Soil Correlator.
C. P. Barnes, Chief Analyst, Soil Uses and Productivity.
Earl D. Fowler, Principal Soil Correlator, Northern States.
Correlation and Inspection by W. J. Latimer, Soil Scientist.
Soils surveyed 1939-40 by K. V. Goodman, Bureau of Plant Industry, Soils, and Agricultural Engineering, in Charge, Snyder Von Day, Soil Conservation Service, and D. B. Lovejoy and J. R. Arno, University of Maine.

☆U.S. GOVERNMENT PRINTING OFFICE: 1953. J. 249024

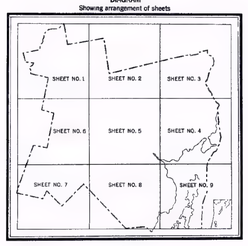
Map compiled by Cartographic Section, Division of Soil Survey, BPISAE, from U. S. Geological Survey topographic quadrangles and aerial photographs.
H. W. Whitlock, Engineer, in Charge.
Polyconic projection, 1927 North American datum.
10000 foot grid based on Maine (East) rectangular coordinate system.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL MAP
WALDO COUNTY - MAINE
SHEET NO. 2

UNIVERSITY OF MAINE
AGRICULTURAL EXPERIMENT STATION

DIAGRAM
Showing arrangement of sheets



COLOR GROUPING

WELL-DRAINED SOILS OF SMOOTH OUTWASH, STREAM TERRACES, AND FLOOD PLAINS
MANAGEMENT GROUP 1
- Adams fine sandy loam
- Adams loamy fine sand
- Agawam loamy very fine sand
- Merrose fine sandy loam
- Merrose fine sandy loam, undulating phase
- Ondawa fine sandy loam
- Stetson fine sandy loam
- Stetson gravelly sandy loam
- Stetson loamy sand

IMPERFECTLY DRAINED SANDY SOILS OF SMOOTH OUTWASH, STREAM TERRACES, AND FLOOD PLAINS
MANAGEMENT GROUP 9
- Alluvial soils, undifferentiated
- Podunk fine sandy loam
- Sudbury fine sandy loam

WELL-DRAINED LEVEL TO UNDULATING SOILS ON MARINE AND LAKE DEPOSITS
MANAGEMENT GROUP 2
- Stetson-Suffield very fine sandy loams
- Suffield fine sandy loam
- Suffield fine sandy loam, eroded phase
- Suffield silt loam
- Suffield silt loam, eroded phase
- Suffield silt loam, severely eroded phase

WELL DRAINED ROLLING TO STEEP SOILS ON MARINE AND LAKE DEPOSITS
MANAGEMENT GROUP 3
- Hartland fine sandy loam
- Hartland fine sandy loam, severely eroded phase
- Hartland fine sandy loam, severly eroded steep phase
- Hartland fine sandy loam, steep phase
- Hartland silt loam
- Hartland silt loam, eroded phase
- Hartland silt loam, severley eroded steep phase
- Hartland silt loam, steep phase

GRAVELLY OR VERY SANDY SOILS ON ROUGH GLACIAL OUTWASH AND TERRACE ESCARPMENTS
MANAGEMENT GROUP 4
- Adams loamy fine sand, steep phase
- Etna fine sandy loam
- Etna gravelly sandy loam
- Etna gravelly sandy loam, hilly phase
- Etna-Hartland very fine sandy loams
- Etna-Hartland very fine sandy loams, eroded hilly phases
- Etna-Hartland very fine sandy loams, eroded phases
- Etna-Hartland very fine sandy loams, hilly pnases
- Etna loamy sand
- Etna loamy sand, hilly phase
- Stetson gravelly sandy loam, steep phase

STONE-CLEARED LEVEL TO SLOPING WELL-DRAINED DEEP SOILS ON COMPACT TILL
MANAGEMENT GROUP 5
- Bangor gravelly silt loam
- Bangor gravelly silt loam, sloping phase
- Bangor silt loam
- Bangor silt loam, moderately eroded phase
- Bangor silt loam, sloping phase
- Paxton loam
- Paxton loam, sloping phase

STONE-CLEARED LEVEL TO SLOPING WELL-DRAINED DEEP SOILS ON LOOSE TO FIRM TILL
MANAGEMENT GROUP 6
- Charlton gravelly fine sandy loam
- Charlton gravelly fine sandy loam, rolling phase
- Charlton loam
- Charlton loam, sloping phase
- Colrain loam
- Colrain loam, rolling phase
- Hermon fine sandy loam
- Hermon fine sandy loam, sloping phase

STONE-CLEARED WELL-DRAINED LEVEL TO SLOPING SHALLOW SOILS
MANAGEMENT GROUP 7
- Canaan loam
- Canaan loam, sloping phase
- Hinsdale gravelly sandy loam, rolling phase
- Hollis gravelly loam
- Hollis gravelly loam, sloping phase
- Hollis loam
- Hollis loam, sloping phase
- Shapleigh loam
- Shapleigh loam, sloping phase
- Thorndike gravelly silt loam
- Thorndike gravelly silt loam, rolling phase
- Thorndike silt loam
- Thorndike silt loam, moderately eroded phase
- Thorndike silt loam, sloping phase

STONE-CLEARED IMPERFECTLY DRAINED SOILS OF UPLANDS
MANAGEMENT GROUP 8
- Acton loam
- Acton loam, sloping phase
- Dixmont loam
- Dixmont loam, sloping phase
- Sutton loam
- Sutton loam, sloping phase

STONE-CLEARED ERODED AND STEEP SOILS ON DEEP TILL
MANAGEMENT GROUP 10
- Bangor gravelly silt loam, eroded sloping phase
- Bangor gravelly silt loam, steep phase
- Bangor silt loam, steep phase
- Charlton loam, eroded sloping phase
- Charlton loam, eroded steep phase
- Charlton loam, steep phase
- Colrain loam, steep phase
- Hermon fine sandy loam, eroded sloping phase
- Hermon fine sandy loam, steep phase
- Paxton loam, eroded sloping phase
- Paxton loam, eroded steep phase
- Paxton loam, steep phase

STONE-CLEARED ERODED AND STEEP SOILS ON SHALLOW TILL OR LEDGE LAND
MANAGEMENT GROUP 11
- Canaan loam, steep phase
- Hollis loam, eroded sloping phase
- Hollis loam, eroded steep phase
- Hollis loam, steep phase
- Shapleigh loam, steep phase
- Thorndike gravelly silt loam, hilly phase
- Thorndike silt loam, eroded hilly phase
- Thorndike silt loam, eroded sloping phase
- Thorndike silt loam, hilly phase

STONE-CLEARED POORLY DRAINED SOILS OF UPLANDS
MANAGEMENT GROUP 12
- Burnham silt loam
- Whitman loam

STONE-FREE IMPERFECTLY AND POORLY DRAINED FINE-TEXTURED SOILS
MANAGEMENT GROUP 13
- Biddeford silt loam
- Buxton silt loam
- Saco silt loam
- Saco silty clay loam

POORLY DRAINED SOILS ON SMOOTH GLACIAL OUTWASH, STREAM TERRACES, AND FLOOD PLAINS
MANAGEMENT GROUP 14
- Rumney loam
- Scarboro fine sandy loam

ORGANIC SOILS, POORLY DRAINED
MANAGEMENT GROUP 15
- Balch peat
- Greenwood peat
- Littlefield peat
- Waterboro muck

STONY IMPERFECTLY AND POORLY DRAINED SOILS OF UPLANDS
MANAGEMENT GROUP 16
- Acton stony loam
- Acton stony loam, sloping phase
- Burnham stony silt loam
- Dixmont stony loam
- Dixmont stony loam, sloping phase
- Sutton stony loam
- Sutton stony loam, shallow phase
- Sutton stony loam, sloping phase
- Sutton very stony loam
- Whitman stony loam
- Whitman very stony loam

STONY LEVEL TO SLOPING WELL-DRAINED SOILS ON DEEP TILL
MANAGEMENT GROUP 16
- Bangor stony silt loam
- Bangor stony silt loam, smooth phase
- Charlton stony loam
- Charlton stony loam, undulating phase
- Colrain stony loam
- Colrain stony loam, undulating phase
- Hermon stony fine sandy loam
- Hermon stony fine sandy loam, undulating phase
- Paxton stony loam
- Paxton stony loam, undulating phase

STONY NONARABLE SOILS
MANAGEMENT GROUP 16
- Bangor-Hartland stony complex
- Bangor stony silt loam, steep phase
- Buxton-Biddeford stony silty clay loams
- Canaan stony loam
- Canaan very stony loam
- Canaan very stony loam, hilly phase
- Charlton stony loam, steep phase
- Colrain stony loam, steep phase
- Hermon very stony fine sandy loam
- Hinsdale stony sandy loam
- Hinsdale stony sandy loam, hilly phase
- Hollis stony loam
- Paxton stony loam, steep phase
- Thorndike stony silt loam
- Thorndike stony silt loam, hilly phase
- Westford stony loam
- Westford very stony loam

MISCELLANEOUS NONARABLE LAND TYPES
MANAGEMENT GROUP 16
- Coastal beach
- Rock outcrop
- Rough stony land (Canaan soil material)
- Rough stony land (Paxton soil material)
- Rough stony land (Thorndike soil material)
- Rough stony land (Westford soil material)
- Fresh water marsh
- Tidal marsh

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☆U.S. GOVERNMENT PRINTING OFFICE: 1953— J. 243024

Scale 1:31,680
1 ½ 0 1 2 Miles
5000 0 5000 10000 Feet

NOTE: See sheet 7 for alphabetical legend and sheet 3 or 6 for conventional signs.

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U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL MAP
WALDO COUNTY - MAINE
Sheet No. 3

UNIVERSITY OF MAINE
AGRICULTURAL EXPERIMENT STATION

370000 FEET — 430000 FEET

69°00'00" — 57'30" — 55' — 52'30" — 50' — 47'30" — 58°45'00"

44°45'00" — 330000 FEET — 42'30" — 40' — 37'30" — 280000 FEET — 44°35'00"

PENOBSCOT CO. / WALDO CO. — PENOBSCOT CO. / HANCOCK CO. — WALDO CO. — HANCOCK CO. / WALDO CO.

WINTERPORT — FRANKFORT — MONROE — PROSPECT

PENOBSCOT RIVER — MARSH BAY — BOWDEN POINT

Ellingwood Corner — Coles Corner — Page Hill — Bald Hill Cove — Oak Point — White Corner — Snow Mountain — Fred Low Hill — Partridge Hill — Winterport Station — Punchbowl Hill — Winterport — West Winterport Church — West Winterport — Downs Hill — Treat Hill — Frankfort — Lane School — Hedgehog Mountain — Delaware Mountain — Dutch Mountain — Treat Point — QUARRY

Sheet No. 2

Sheet No. 4

CONVENTIONAL SIGNS

CULTURE
(Printed in black)

- City or Village, Roads, Buildings, Wharves, Jetties, Breakwater, Levee, Lighthouse, Fort
- Secondary roads, Trails
- Railroads
- Bridges, Ferry
- Railroad crossings
- Ford, Dam, Sawmill, Windmill
- Boundary lines
- School, Church, Creamery, Cemeteries
- Boundary lines
- Triangulation station, Boundary monument, Oil or Gas wells
- U. S. Township and Section lines, Recovered corners
- Forest fire station, Airway beacon, Oil or Gas tanks
- Transmission line, Oil or Gas pipe line
- Mine or Quarry, Gravel pit, Rock outcrop, Made land
- Soil boundaries: Stony, Gravelly, and Cherty areas

RELIEF
(Printed in brown or black)

- Contours, Depression contours
- Prominent hills or Mountain peaks
- Sand, Wash, Sand dunes
- Bluff, Escarpment, Mine dumps

DRAINAGE
(Printed in blue)

- Streams, Springs, Wells, Wet spots
- Lakes, Ponds, Intermittent lakes
- Unsurveyed and Intermittent streams
- Water pipe lines, Canals, Ditches, Flumes
- Fresh Water marsh, Tidal marsh
- Submerged marsh, Tidal flats

The above signs are in current use on the soil maps. Variations from this usage appear in some maps of earlier dates.

SPECIAL SYMBOLS

S — Sheet and/or some gully erosion

DIAGRAM
Showing arrangement of sheets

SHEET NO. 1	SHEET NO. 2	SHEET NO. 3
SHEET NO. 6	SHEET NO. 5	SHEET NO. 4
SHEET NO. 7	SHEET NO. 8	SHEET NO. 9

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☆ U.S. GOVERNMENT PRINTING OFFICE: 1953: J. 243024

Scale 1:31,680

1 — ½ — 0 — 1 — 2 Miles

5000 — 0 — 5000 — 10000 Feet

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U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL MAP
WALDO COUNTY - MAINE
SHEET NO. 4

UNIVERSITY OF MAINE
AGRICULTURAL EXPERIMENT STATION

Sheet No. 3

Sheet No. 5

Sheet No. 9

FRANKFORT
PROSPECT
STOCKTON SPRINGS
SEARSPORT
SWANVILLE
BELFAST
MONROE

Mount Waldo
Mosquito Mountain
Heagan Mountain
Mack Mountain
Eustis Mountain
Mount Tuck
Oak Hill
Halfmoon Pond
Swan Lake
North Searsport
Clark School
Prospect
Dodge Corner
Brown Corner
Smith Hill
Hedgehog Hill
Mount Ephraim
Swanville
Union District School
Porter School
McClure Pond
Upper Mason Pond
Smith Pond
Cain Pond
Searsport
Searsport Station
Mack Pt.
Kidder Pt.
Long Cove
Stockton Harbor
Fort Pt.
Squaw Head
Sandy Pt.
Stockton Springs
Fort Point Cove
Stowers Meadows
Gondola Cove
Mill Cove
Sandypoint
Sears Island
Fletcher Hill
Blanchard Hill
Patterson Pt.
Moose Pt.
BELFAST
BELFAST BAY
PENOBSCOT BAY
PENOBSCOT RIVER
Prospect Ferry
FORT KNOX
WALDO HANCOCK TOLL BRIDGE
HANCOCK CO.
WALDO CO.

DIAGRAM
Showing arrangement of sheets

SHEET NO. 1	SHEET NO. 2	SHEET NO. 3
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☆ U.S. GOVERNMENT PRINTING OFFICE: 1953: J. 343034

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1 ½ 0 1 2 Miles
5000 0 5000 10000 Feet

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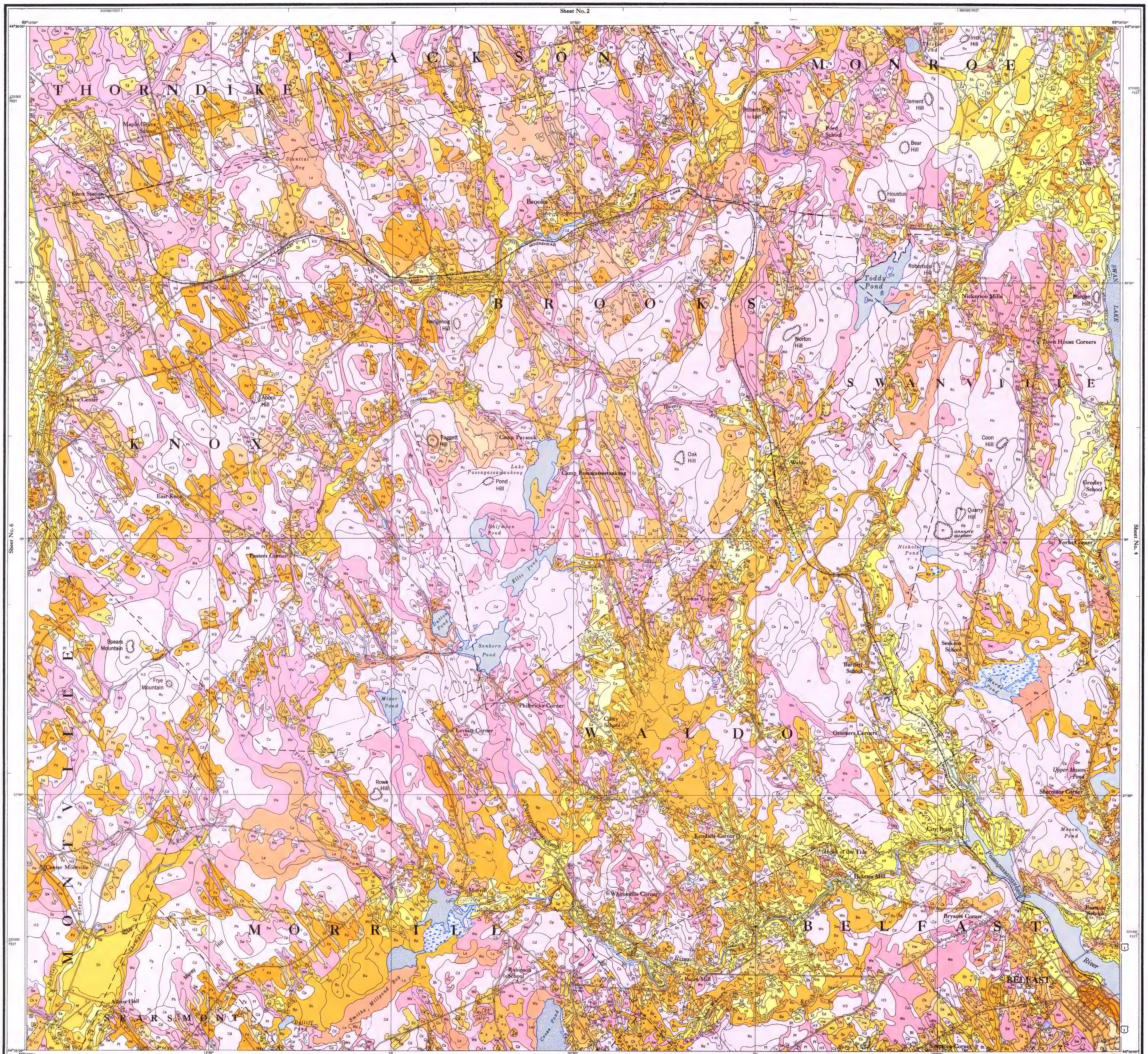
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL MAP
WALDO COUNTY- MAINE
SHEET NO. 5

UNIVERSITY OF MAINE
AGRICULTURAL EXPERIMENT STATION



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U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL MAP
WALDO COUNTY - MAINE
SHEET NO. 6

UNIVERSITY OF MAINE
AGRICULTURAL EXPERIMENT STATION

Sheet No. 1

Sheet No. 5

Sheet No. 7

CONVENTIONAL SIGNS

CULTURE
(Printed in black)

City or Village, Roads, Buildings, Wharves, Jetties, Breakwater, Levee, Lighthouse, Fort

Secondary roads, Trails

Railroads

Bridges, Ferry

Railroad crossings

Ford, Dam, Sawmill, Windmill

Boundary lines

School, Church, Creamery, Cemeteries

Boundary lines

Triangulation station, Boundary monument, Oil or Gas wells

U. S. Township and Section lines, Recovered corners

Forest fire station, Airway beacon, Oil or Gas tanks

Transmission line, Oil or Gas pipe line

Mine or Quarry, Gravel pit, Rock outcrop, Made land

Soil boundaries; Stony, Gravelly, and Cherty areas

RELIEF
(Printed in brown or black)

Contours, Depression contours

Prominent hills or Mountain peaks

Sand, Wash, Sand dunes

Bluff, Escarpment, Mine dumps

DRAINAGE
(Printed in blue)

Streams, Springs, Wells, Wet spots

Lakes, Ponds, Intermittent lakes

Unsurveyed and Intermittent streams

Water pipe lines, Canals, Ditches, Flumes

Fresh Water marsh, Tidal marsh

Submerged marsh, Tidal flats

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SPECIAL SYMBOLS

S— Sheet and/or some gully erosion

DIAGRAM
Showing arrangement of sheets

SHEET NO. 1 | SHEET NO. 2 | SHEET NO. 3
SHEET NO. 6 | SHEET NO. 5 | SHEET NO. 4
SHEET NO. 7 | SHEET NO. 8 | SHEET NO. 9

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☆ U.S. GOVERNMENT PRINTING OFFICE: 1953 J. 24302-4

Scale 1:31,680
1 ½ 0 1 2 Miles
5000 0 5000 10000 Feet

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U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL MAP
WALDO COUNTY - MAINE
SHEET NO. 7

UNIVERSITY OF MAINE
AGRICULTURAL EXPERIMENT STATION

Sheet No. 6

Sheet No. 8

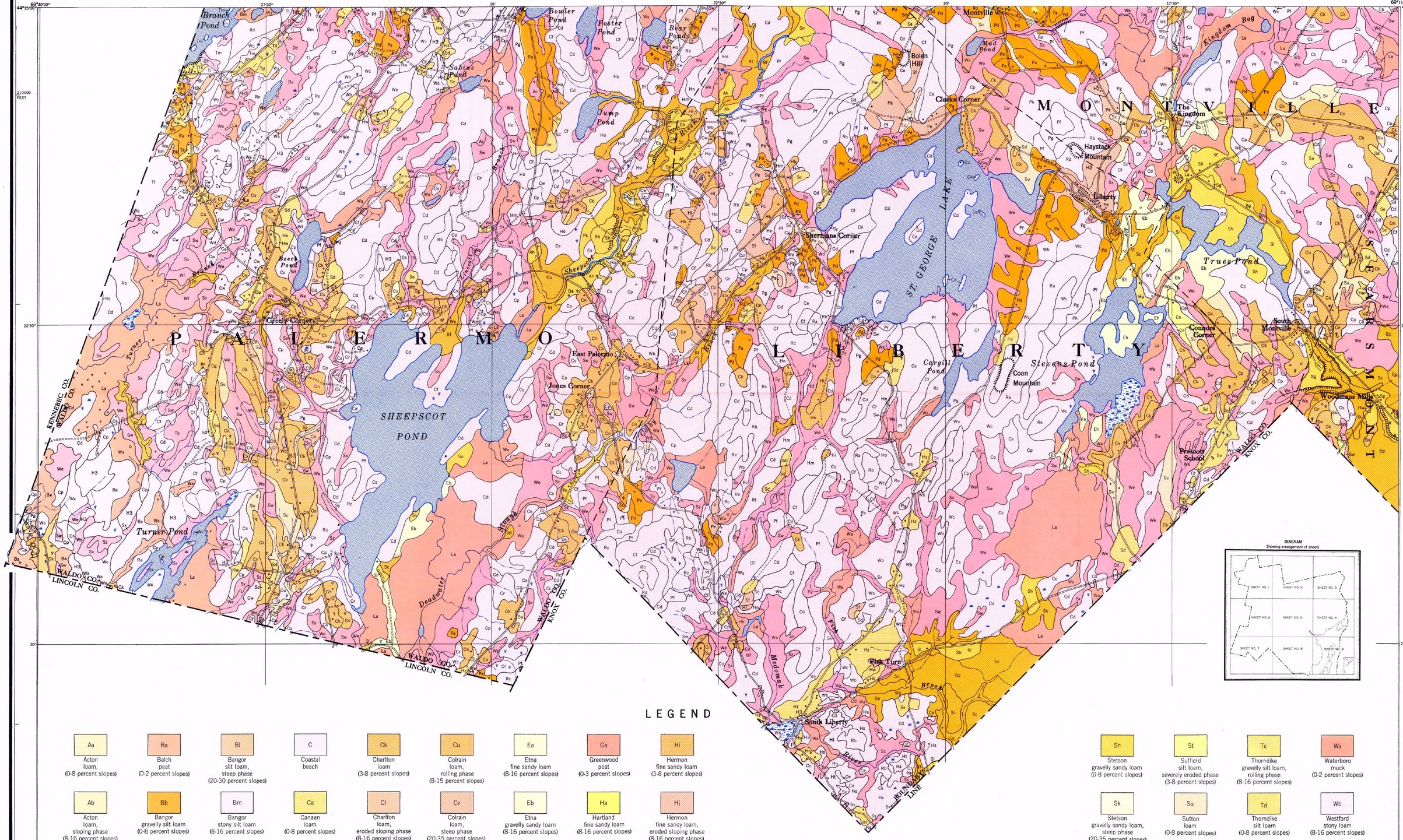


DIAGRAM
Showing arrangement of sheets

LEGEND

Aa Acton loam, (0-8 percent slopes)	Ba Balch peat (0-2 percent slopes)	Bl Bangor silt loam, steep phase (20-30 percent slopes)	C Coastal beach	Ck Charlton loam (3-8 percent slopes)	Cu Colrain loam, rolling phase (8-15 percent slopes)	Ea Etna fine sandy loam (8-16 percent slopes)	Ga Greenwood peat (0-3 percent slopes)	Hi Hermon fine sandy loam (3-8 percent slopes)
Ab Acton loam, sloping phase (8-16 percent slopes)	Bb Bangor gravelly silt loam (0-8 percent slopes)	Bm Bangor stony silt loam (8-16 percent slopes)	Ca Canaan loam (0-8 percent slopes)	Cl Charlton loam, eroded sloping phase (8-16 percent slopes)	Cv Colrain loam, steep phase (20-35 percent slopes)	Eb Etna gravelly sandy loam (8-16 percent slopes)	Ha Hartland fine sandy loam (8-16 percent slopes)	Hj Hermon fine sandy loam, eroded sloping phase (8-16 percent slopes)
Ac Acton stony loam (0-8 percent slopes)	Bc Bangor gravelly silt loam, eroded sloping phase (8-16 percent slopes)	Bn Bangor stony silt loam, smooth phase (0-8 percent slopes)	Cb Canaan loam, sloping phase (8-15 percent slopes)	Cm Charlton loam, eroded steep phase (20-30 percent slopes)	Cw Colrain stony loam (8-16 percent slopes)	Ec Etna gravelly sandy loam, hilly phase (20-30 percent slopes)	Hb Hartland fine sandy loam, severely eroded phase (8-16 percent slopes)	Hk Hermon fine sandy loam, sloping phase (8-16 percent slopes)
Ad Acton stony loam, sloping phase (8-16 percent slopes)	Bd Bangor gravelly silt loam, sloping phase (8-16 percent slopes)	Bo Bangor stony silt loam, steep phase (20-30 percent slopes)	Cc Canaan loam, steep phase (20-30 percent slopes)	Cn Charlton loam, sloping phase (8-15 percent slopes)	Cx Colrain stony loam, steep phase (20-45 percent slopes)	Ed Etna-Hartland very fine sandy loams (8-16 percent slopes)	Hc Hartland fine sandy loam, severely eroded steep phase (20-35 percent slopes)	Hl Hermon fine sandy loam, steep phase (20-45 percent slopes)
Ae Adams fine sandy loam (0-3 percent slopes)	Be Bangor gravelly silt loam, steep phase (20-30 percent slopes)	Bp Biddeford silt loam (0-3 percent slopes)	Cd Canaan stony loam (0-16 percent slopes)	Co Charlton loam, steep phase (20-30 percent slopes)	Cy Colrain stony loam, undulating phase (3-8 percent slopes)	Ee Etna-Hartland very fine sandy loams, eroded hilly phases (16-30 percent slopes)	Hd Hartland fine sandy loam, steep phase (20-35 percent slopes)	Hm Hermon stony fine sandy loam (8-16 percent slopes)
Af Adams loamy fine sand (3-8 percent slopes)	Bf Bangor-Hartland stony complex (8-16 percent slopes)	Br Burnham silt loam (0-3 percent slopes)	Ce Canaan very stony loam (8-16 percent slopes)	Cp Charlton stony loam (8-16 percent slopes)	Da Dixmont loam (0-8 percent slopes)	Ef Etna-Hartland very fine sandy loams, eroded phases (8-16 percent slopes)	He Hartland silt loam (8-16 percent slopes)	Hn Hermon stony fine sandy loam, undulating phase (3-8 percent slopes)
Ag Adams loamy fine sand, steep phase (20-40 percent slopes)	Bg Bangor silt loam (0-8 percent slopes)	Bs Burnham stony silt loam (0-5 percent slopes)	Cf Canaan very stony loam, hilly phase (20-30 percent slopes)	Cr Charlton stony loam, steep phase (20-30 percent slopes)	Db Dixmont loam, sloping phase (8-16 percent slopes)	Eg Etna-Hartland very fine sandy loams, hilly phases (16-30 percent slopes)	Hf Hartland silt loam, eroded phase (8-16 percent slopes)	Ho Hermon very stony fine sandy loam (10-45 percent slopes)
Ah Agawam loamy very fine sand (0-3 percent slopes)	Bh Bangor silt loam, moderately eroded phase (0-8 percent slopes)	Bt Buxton-Biddeford stony silty clay loams (0-5 percent slopes)	Cg Charlton gravelly fine sandy loam (3-8 percent slopes)	Cs Charlton stony loam, undulating phase (0-8 percent slopes)	Dc Dixmont stony loam (0-8 percent slopes)	Eh Etna loamy sand (8-16 percent slopes)	Hg Hartland silt loam, severely eroded steep phase (20-30 percent slopes)	Hr Hinsdale gravelly sandy loam, rolling phase (8-16 percent slopes)
Ak Alluvial soils, undifferentiated (0-3 percent slopes)	Bk Bangor silt loam, sloping phase (8-16 percent slopes)	Bu Buxton silt loam (0-3 percent slopes)	Ch Charlton gravelly fine sandy loam, rolling phase (8-15 percent slopes)	Ct Colrain loam (0-8 percent slopes)	Dd Dixmont stony loam, sloping phase (8-16 percent slopes)	Ek Etna loamy sand, hilly phase (20-30 percent slopes)	Hh Hartland silt loam, steep phase (20-50 percent slopes)	Hs Hinsdale stony sandy loam (5-16 percent slopes)

Ht Hinsdale stony sandy loam, hilly phase (16-30 percent slopes)	H2 Hollis loam, steep phase (20-30 percent slopes)	Pb Paxton loam, eroded sloping phase (8-16 percent slopes)	Pk Podunk fine sandy loam (0-3 percent slopes)	Sa Saco silt loam (0-2 percent slopes)	Sh Stetson gravelly sandy loam (0-8 percent slopes)	St Suffield silt loam, severely eroded phase (3-8 percent slopes)	Tc Thorndike gravelly silt loam, rolling phase (8-16 percent slopes)	Wa Waterboro muck (0-2 percent slopes)
Hu Hollis gravelly loam (0-8 percent slopes)	H3 Hollis stony loam (0-16 percent slopes)	Pc Paxton loam, eroded steep phase (20-30 percent slopes)	Ra Rock outcrop (0-100 percent slopes)	Sb Saco silty clay loam (0-2 percent slopes)	Sk Stetson gravelly sandy loam, steep phase (20-35 percent slopes)	Su Sutton loam (0-8 percent slopes)	Td Thorndike silt loam (0-8 percent slopes)	Wb Westford stony loam (8-16 percent slopes)
Hv Hollis gravelly loam, sloping phase (8-16 percent slopes)	La Littlefield peat (0-2 percent slopes)	Pd Paxton loam, sloping phase (8-16 percent slopes)	Rb Rough stony land (Canaan soil material) (30-50+percent slopes)	Sc Scarboro fine sandy loam (0-2 percent slopes)	Sl Stetson loamy sand (0-8 percent slopes)	Sv Sutton loam, sloping phase (8-16 percent slopes)	Te Thorndike silt loam, eroded hilly phase (20-30 percent slopes)	Wc Westford very stony loam (16-45 percent slopes)
Hw Hollis loam (0-8 percent slopes)	Ma Melrose fine sandy loam (0-3 percent slopes)	Pe Paxton loam, steep phase (20-30 percent slopes)	Rc Rough stony land (Paxton soil material) (30-50+ percent slopes)	Sd Shapleigh loam (0-8 percent slopes)	So Suffield fine sandy loam (3-8 percent slopes)	Sy Sutton stony loam, sloping phase (8-16 percent slopes)	Th Thorndike silt loam, moderately eroded phase (3-8 percent slopes)	Wf Whitman very stony loam (0-10 percent slopes)
Hx Hollis loam, eroded sloping phase (8-16 percent slopes)	Mb Melrose fine sandy loam, undulating phase (3-8 percent slopes)	Pf Paxton stony loam (8-16 percent slopes)	Rd Rough stony land (Thorndike soil material) (30-50+ percent slopes)	Se Shapleigh loam, sloping phase (8-16 percent slopes)	Sp Suffield fine sandy loam, eroded phase (3-8 percent slopes)	Sz Sutton very stony loam (3-16 percent slopes)	Tk Thorndike silt loam, sloping phase (8-15 percent slopes)	Fresh water marsh
Hy Hollis loam, eroded steep phase (20-30 percent slopes)	Oa Ondawa fine sandy loam (0-3 percent slopes)	Pg Paxton stony loam, steep phase (20-30 percent slopes)	Re Rough stony land (Westford soil material) (30-50+ percent slopes)	Sf Shapleigh loam, steep phase (20-30 percent slopes)	Sr Suffield silt loam (3-8 percent slopes)	Ta Thorndike gravelly silt loam (0-8 percent slopes)	Tl Thorndike stony silt loam (8-16 percent slopes)	Tidal marsh
Hz Hollis loam, sloping phase (8-16 percent slopes)	Pa Paxton loam (0-8 percent slopes)	Ph Paxton stony loam, undulating phase (3-8 percent slopes)	Rf Rumney loam (0-2 percent slopes)	Sg Stetson fine sandy loam (0-8 percent slopes)	Ss Suffield silt loam, eroded phase (3-8 percent slopes)	Tb Thorndike gravelly silt loam, hilly phase (15-30 percent slopes)	Tm Thorndike stony silt loam, hilly phase (16-30 percent slopes)	

J. Kenneth Ableiter, Chief Soil Correlator.
C. P. Barnes, Chief Analyst, Soil Uses and Productivity.
Earl D. Fowler, Principal Soil Correlator, Northern States.
Correlation and inspection by W. J. Latimer, Senior Soil Scientist.
Soils surveyed 1939-40 by K. V. Goodman, Bureau of Plant Industry, Soils, and Agricultural Engineering, in Charge, Snyder Von Day, Soil Conservation Service, and D. B. Lovejoy and J. R. Arno, University of Maine.

☆ U.S. GOVERNMENT PRINTING OFFICE: 1953 J. 243024

Scale 1:31,680

1 ½ 0 1 2 Miles

5000 0 5000 10000 Feet

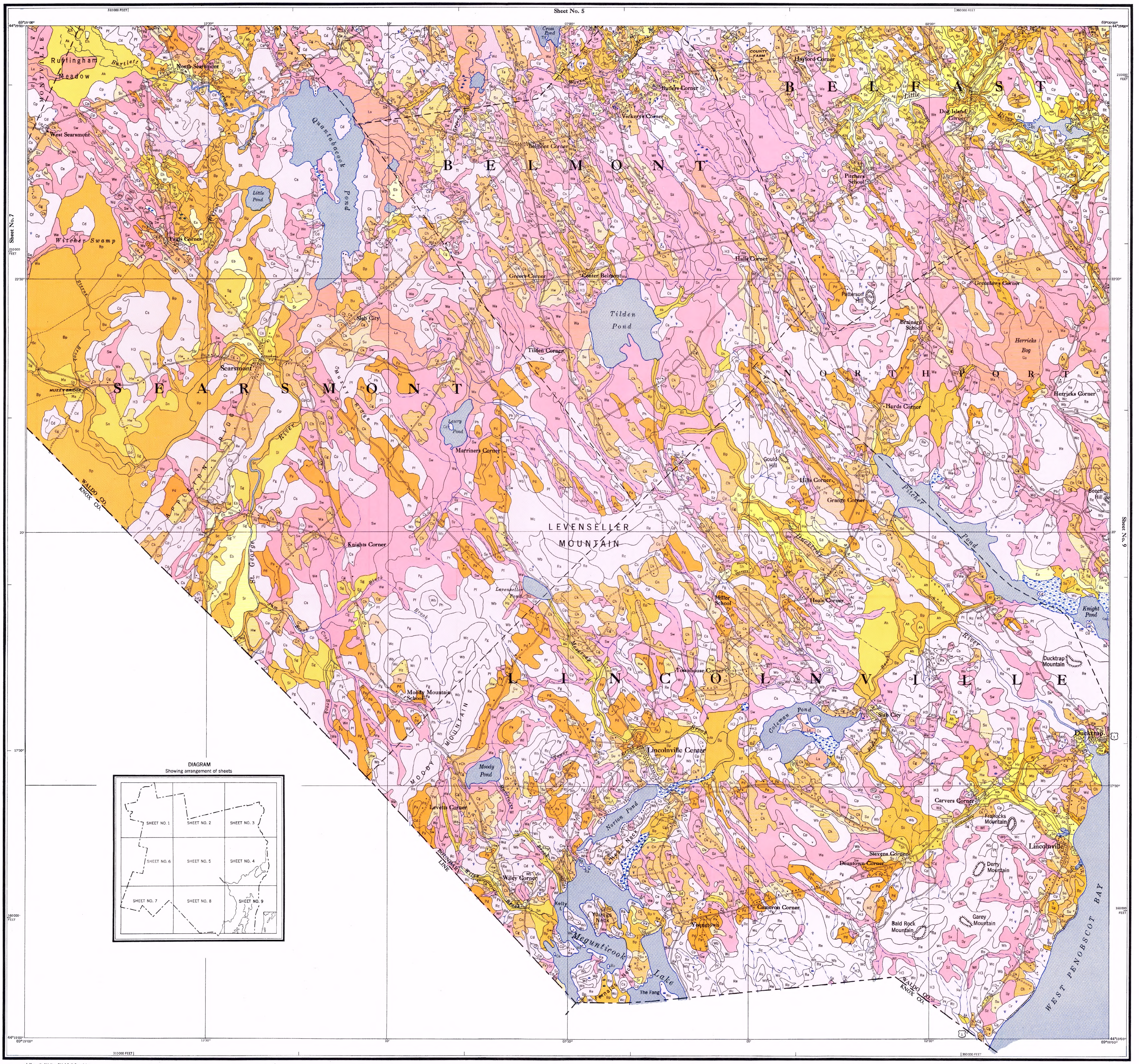
NOTE: See sheet 2 for color grouping and sheet 3 or 6 for conventional signs.

Map compiled by Cartographic Section, Division of Soil Survey, BPISAE, from U. S. Geological Survey topographic quadrangles and aerial photographs.
H. W. Whittock, Engineer, in Charge.
Polyconic projection, 1927 North American datum.
10000 foot grid based on Maine (East) rectangular coordinate system.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL MAP
WALDO COUNTY - MAINE
SHEET NO. 8

UNIVERSITY OF MAINE
AGRICULTURAL EXPERIMENT STATION



Sheet No. 5
Sheet No. 7
Sheet No. 9
BELFAST
BELMONT
SEARSMONT
NORTHPORT
LINCOLNVILLE
LEVENSELLER MOUNTAIN
Quantabacook Pond
Tilden Pond
Pitcher Pond
Megunticook Lake
Norton Pond
Coleman Pond
Moody Pond
Levenseller Pond
Lawry Pond
Little Pond
Knight Pond
Ruffingham Meadow
Wights Swamp
Herricks Bog
North Searsmont
West Searsmont
Searsmont
Belmont Corner
Vickerys Corner
Butlers Corner
Hayford Corner
Doe Island Corner
Pitchers School
Halls Corner
Greers Corner
Center Belmont
Greenlaws Corner
Patterson Hill
Brainerd School
Tilden Corner
Slab City
Hurds Corner
Herricks Corner
Marriners Corner
Gould Hill
Hills Corner
Grange Corner
Knights Corner
Heals Corner
Miller School
Moody Mountain School
Townhouse Corner
Ducktrap Mountain
Ducktrap
Lincolnville Center
Levetts Corner
Wiley Corner
Carvers Corner
Lincolnville
Stevens Corner
Beantown Corner
Dorry Mountain
Cameron Corner
Bald Rock Mountain
Garey Mountain
Youngtown
Youngs Neck
The Fang
MOODY MOUNTAIN
WEST PENOBSCOT BAY
WALDO CO.
KNOX CO.
DIAGRAM
Showing arrangement of sheets
SHEET NO. 1
SHEET NO. 2
SHEET NO. 3
SHEET NO. 4
SHEET NO. 5
SHEET NO. 6
SHEET NO. 7
SHEET NO. 8
SHEET NO. 9
44°15′00″
69°15′00″
12′30″
10′
02′30″
44°15′00″
69°00′00″
310000 FEET
360000 FEET

J. Kenneth Ableiter, Chief Soil Correlator.
C. P. Barnes, Chief Analyst, Soil Uses and Productivity.
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☆U.S. GOVERNMENT PRINTING OFFICE: 1953: J. 243024

Scale 1:31,680
1 ½ 0 1 2 Miles
5000 0 5000 10000 Feet

NOTE: See sheet 7 for alphabetical legend, sheet 2 for color grouping, and sheet 3 or 6 for conventional signs.

Map compiled by Cartographic Section, Division of Soil Survey, BPISAE, from U. S. Geological Survey topographic quadrangles and aerial photographs. H. W. Whitlock, Engineer, in Charge.
Polyconic projection, 1927 North American datum.
10000 foot grid based on Maine (East) rectangular coordinate system.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL MAP
WALDO COUNTY - MAINE
SHEET NO. 9

UNIVERSITY OF MAINE
AGRICULTURAL EXPERIMENT STATION

Sheet No. 4

Sheet No. 8

BELFAST BAY
WEST PENOBSCOT BAY
EAST PENOBSCOT BAY
PENOBSCOT BAY
WALDO CO. HANCOCK CO.
WALDO CO. KNOX CO.

BELFAST
Browns Head
East Northport
Bayside
Knowlton Hill
Priest Hill
Mt. Percival
Temple Heights
Beech Hill
Northport
Saturday Cove
Shaw Brook
Jackson Hill
Knight Pond
Little Harbor
Great Spruce Head
Ducktrap Harbor
Spruce Head
NORTHPORT

Turtle Head
Turtle Head Cove
Marshall Pt.
Kedears Hill
LIMEKILN LANDING
Tripp
Coombs Pt.
Parker Cove
Meadow Pond
Hutchins I.
Coombs Cove
Ryder Cove
Sprague Cove
North Isleboro
Sabbathday Harbor
Ram I.
Seal I.
Keller Pt.
Seal Harbor
Flat I.
Bounty Cove
Crow Cove
The Narrows
Islesboro Harbor
Islesboro
Hewes Pt.
Gooseberry Pt.
Broad Cove
Pendleton Cove
Grindel Pt.
Sherman Pt.
Warren I.
Spruce I.
Thrumcap Monument
Dark Harbor
Ames Cove
Philbrook Cove
Cradle Cove
SEVEN HUNDRED ACRE ISLAND
Gilkey Harbor
ISLESBORO

DIAGRAM
Showing arrangement of sheets
SHEET NO. 1 | SHEET NO. 2 | SHEET NO. 3
SHEET NO. 6 | SHEET NO. 5 | SHEET NO. 4
SHEET NO. 7 | SHEET NO. 8 | SHEET NO. 9

Minot I.
Middle I.
Ensign Is.
Job Island
Pendleton Pt.
Lime I.
Lasell I.
Mouse I.
Goose I.
Saddle I.
Mark I.
Robinson Rock

J. Kenneth Ableiter, Chief Soil Correlator.
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1 ½ 0 1 2 Miles
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